



UTILITY PATENT APPLICATION  
UNDER 37 CFR 1.53(b)

HONORABLE COMMISSIONER OF  
PATENTS AND TRADEMARKS  
Washington D.C. 20231

Case Docket No. 041-2048

1C518 U.S. PTO  
12/09/2011 12:03/98

Siri

Transmitted herewith for filing is the patent application of:

INVENTOR: Yuko ARAI et al.

FOR: METHOD AND APPARATUS FOR PREPARING AND TRANSMITTING ELECTRONIC  
PROGRAM INFORMATION AND APPARATUS FOR PRODUCING ELECTRONIC  
PROGRAM GUIDE FROM THE ELECTRONIC PROGRAM INFORMATION

Enclosed are:

- [X] 159 pages of specification, claims, abstract
- [X] Declaration & Power of Attorney
- [X] Priority Claimed
- [X] Certified copy of Japan 9-352048
- [X] 43 sheets of formal drawing
- [X] An assignment of the invention to Matsushita Electric Industrial Co., Ltd.
- and the assignment recordation fee
- [X] Return Receipt Postcard
- [ ] Information Disclosure Statement, Form PTO-1449
- [ ] Copies of IDS Citations
- [ ]

The filing fee has been calculated as shown below:

<b>(1) FOR</b>	<b>(2) NO. FILED</b>	<b>(3) NO. EXTRA</b>	<b>(4) RATE</b>	<b>(5) AMOUNT</b>
<b>TOTAL CLAIMS</b>	46	-20	26	x \$18.00 = \$468.00
<b>INDEPENDENT CLAIMS</b>	3	-3		x \$78.00 = 0.00
<b>MULTIPLE DEPENDENT CLAIM(S) (If applicable)</b>			+ \$260.00	= 00.00
			<b>BASIC FEE</b>	\$ 760.00
				<hr/>
			<b>Total of above calculations</b>	\$1,228.00

[X] Assignment & Recording Fee \$40.00

- Check in the amount of \$1,268.00 is attached hereto.
- Please charge my Deposit Account No. 07-1337 in the amount of \$\_\_\_\_\_. A duplicate copy of this sheet is enclosed.
- The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or

credit any overpayment to Deposit Account No. 07-1337. A duplicate copy is enclosed.

Any additional filing fees required under 37 CFR 1.16.

The Commissioner is hereby authorized to charge payment of following fees during the pendency of this application or credit any overpayment to Deposit Account No. 07-1337. A duplicate copy of this sheet is enclosed.

Any patent application processing fees under 37 CFR 1.17.

Any filing fees under 37 CFR 1.16 for presentation of extra claims.

LOWE HAUPTMAN GOPSTEIN  
GILMAN & BERNER, LLP

  
Israel Gopstein  
Registration No. 27,333

2034 Eisenhower Avenue, Suite 200  
Alexandria, Virginia 22314  
(703) 684-1111 IG:tmf  
**Date:** December 3, 1998  
Fax: (703) 518-5499

DEPARTMENT OF COMMERCE

SPECIFICATIONTITLE OF THE INVENTION

METHOD AND APPARATUS FOR PREPARING AND TRANSMITTING ELECTRONIC  
5 PROGRAM INFORMATION AND APPARATUS FOR PRODUCING ELECTRONIC  
PROGRAM GUIDE FROM THE ELECTRONIC PROGRAM INFORMATION

BACKGROUND OF THE INVENTION

## 1.FIELD OF THE INVENTION:

10 The present invention relates to method and apparatus for preparing and transmitting electronic program information multiplexed with video and audio signals. Also, the present invention relates to an apparatus for producing an electronic program guide from the electronic program information  
15 multiplexed with the video and audio signals.

## 2.DESCRIPTION OF THE RELATED ART:

In a digital satellite broadcasting, a video signal and an audio signal are broadcasted from a center station to a plurality of terminals according to the Moving Picture Experts  
20 Group 2 (MPEG2). In the MPEG2, video and audio signals are multiplexed with each other to a packet in the center station, and a plurality of packets are transmitted to each terminal in a form of a transport stream (TS) representing a transmission line. In this case, electronic program information prescribed  
25 in the MPEG2 and DVB is transmitted with the video and audio

signals. The electronic program information includes both control information used to reproduce the video and audio signals multiplexed with each other and electronic program guide information used to prepare an electronic program guide.

5 The electronic program information is described in a form of a section type table, and the section type is prescribed in the MPEG2 and DVB.

#### 2.1. PREVIOUSLY PROPOSED ART:

Fig. 1 shows a configuration of a conventional digital  
10 broadcasting system.

As shown in Fig. 1, a conventional digital broadcasting system 300 is composed of a broadcasting station center system 301 and a plurality of viewer's terminals 302. In the broadcasting station center system 301, video and audio  
15 signals of television programs are transmitted from a television program and electronic program information organizing system 312 to a video/audio stream producing system 313, and the video and audio signals are prepared as a video /audio stream in the system 313. Also, electronic program  
20 scheduling information is transmitted from the television program and electronic program information organizing system 312 to an electronic program information preparing and transmitting system 314, and electronic program information, which is composed of program information used to reproduce the  
25 video and audio signals multiplexed with each other and added

information used to prepare an electronic program information, is prepared in the system 314. The video/audio stream produced in the system 313 and the electronic program information prepared in the system 314 are multiplexed with each other in 5 a TS multiplexer and up-link system 315, the electronic program information multiplexed with the video/audio stream is received in an information receiving device (IRD) 302 of each viewer's terminal (or a television set) through a satellite 316.

10 Also, a cipher key information is transmitted from a cipher key managing and producing system 317 to the IRD 302, and television program viewing information is returned from the IRD 302 to an accounting information collecting system 318 through a public switched telephone network (PSTN) 319.

15 2.2. PROBLEMS TO BE SOLVED BY THE INVENTION:

However, because an electronic program guide (called a common electronic program guide) of television programs provided by all broadcast service enterprisers is prepared in the conventional digital broadcasting system 300 and is 20 displayed in each viewer's terminal 302, an electronic program guide (called an individual electronic program guide) of television programs provided by each broadcast service enterpriser cannot be prepared in the conventional digital broadcasting system 300.

25 Also, even though each broadcast service enterpriser

desires to provide various services for the viewers, because the services provided by one broadcast service enterpriser is guided in the electronic program guide in the same format as those provided by another broadcast service enterpriser, 5 features of the services provided by each broadcast service enterpriser cannot be realized by the viewer. Therefore, a high-definition television program service can be guided at the most.

10

#### SUMMARY OF THE INVENTION

A first object of the present invention is to provide, with due consideration to the drawbacks of such a conventional digital broadcasting system, electronic program information preparing and transmitting apparatus and method in which 15 electronic program information used for the preparation of an individual electronic program guide and a common electronic program guide is prepared and transmitted to a viewer while effectively using a data transmission band.

Also, a second object of the present invention is to 20 provide an electronic program guide producing apparatus in which an individual electronic program guide and a common electronic program guide are produced according to the electronic program information received from the electronic program information preparing and transmitting apparatus and 25 displaying the individual electronic program guide and the

common electronic program guide while distinguishing the individual electronic program guide from the common electronic program guide.

The first object of the present invention is provided by an 5 electronic program information preparing and transmitting apparatus, comprising:

electronic program information preparing means for preparing general electronic program information, in which electronic program information of a plurality of broadcast 10 service enterprisers is described on a general level, and preparing individual electronic program information, in which the electronic program information of one broadcast service enterpriser is described on an individual level, for each broadcast service enterpriser; and 15 electronic program information transmitting means for transmitting the general electronic program information of the broadcast service enterprisers and the individual electronic program information of the broadcast service enterprisers prepared by the electronic program information preparing 20 means.

Also, the first object is achieved by an electronic program information preparing and transmitting method, comprising the steps of:

preparing general electronic program information described 25 on a general level from electronic program information of a

plurality of broadcast service enterprisers;

preparing individual electronic program information described on an individual level from the electronic program information of one broadcast service enterpriser for each 5 broadcast service enterpriser; and

transmitting the general electronic program information of the broadcast service enterprisers and the individual electronic program information of the broadcast service enterprisers.

10 In the above configuration and steps, general electronic program information described on a general level and individual electronic program information described on an individual level are prepared from electronic program information of one broadcast service enterpriser by the 15 electronic program information preparing means for each broadcast service enterpriser. Thereafter, the pieces of general electronic program information corresponding to the broadcast service enterprisers and one piece of individual electronic program information corresponding to one broadcast 20 service enterpriser are transmitted to a viewer by the electronic program information transmitting means for each piece of individual electronic program information.

Accordingly, because individual electronic program information corresponding to all broadcast service 25 enterprisers is not prepared but individual electronic program

information corresponding to one broadcast service enterpriser is prepared and carried in a transport stream of the broadcast service enterpriser for each broadcast service enterpriser, a data transmission band required for each broadcast service enterpriser can be effectively used.

Also, because the viewer receives the piece of individual electronic program information corresponding to each broadcast service enterpriser, an individual electronic program guide described on the individual level can be prepared on the viewer side for each broadcast service enterpriser. In particular, in cases where the individual level corresponds to a high detailed degree, the viewer can watch an individual electronic program guide described on the high detailed degree for each broadcast service enterpriser. Therefore, the viewer can read detailed information of each television program listed in the individual electronic program guide.

Also, because the viewer receives the pieces of general electronic program information corresponding to the broadcast service enterprisers, a common electronic program guide described on the general level for the broadcast service enterprisers can be prepared on the viewer side. In particular, in cases where the general level corresponds to a low detailed degree, the viewer can watch a common electronic program guide of the broadcast service enterprisers on the low detailed degree. Therefore, even though a large number of

television programs are listed in the common electronic program guide, the viewer can easily realize information of the television programs.

Also, because general electronic program information and 5 individual electronic program information are prepared from electronic program information of one broadcast service enterpriser for each broadcast service enterpriser, each broadcast service enterpriser is not required to prepare general electronic program information of another broadcast 10 service enterpriser.

It is applicable that transport stream specifying information indicating a transport stream be prepared by the electronic program information preparing means for each piece of individual electronic program information, and 15 the electronic program information transmitting means comprise:

electronic program information outputting means for outputting the pieces of general electronic program information of the broadcast service enterprisers, the pieces 20 of individual electronic program information of the broadcast service enterprisers and the pieces of transport stream specifying information prepared by the electronic program information preparing means; and

electronic program information multiplexing means for 25 multiplexing the pieces of general electronic program

information of the broadcast service enterprisers and one piece of individual electronic program information of one broadcast service enterpriser output by the electronic program information outputting means to produce combined electronic 5 program information for each piece of individual electronic program information, carrying each piece of combined electronic program information in a transport stream, which is indicated by the piece of transport stream specifying information corresponding to the piece of individual 10 electronic program information multiplexed in the piece of combined electronic program information, and transmitting the pieces of combined electronic program information carried in the transport streams to the viewer.

In the above configuration, each piece of combined 15 electronic program information is carried in a transport stream indicated by the piece of transport stream specifying information corresponding to the piece of individual electronic program information. In other words, each piece of combined electronic program information, in which the piece of 20 individual electronic program information of one broadcast service enterpriser is multiplexed, is carried in the transport stream of the broadcast service enterpriser. Therefore, the individual electronic program information of the broadcast service enterpriser can be displayed when a 25 viewer watches a television program of the broadcast service

enterpriser. Accordingly, there is no probability that the individual electronic program information of a particular broadcast service enterpriser is erroneously displayed when the viewer watches a television program provided by a  
5 broadcast service enterpriser other than the particular broadcast service enterpriser, so that a trouble between broadcast service enterprisers can be avoided.

It is also applicable that one piece of individual electronic program information of a particular broadcast  
10 service enterpriser and pieces of general electronic program information of broadcast service enterprisers other than the particular broadcast service enterpriser be transmitted to the viewer for each piece of individual electronic program information by the electronic program information transmitting  
15 means.

In the above configuration, general electronic program information of each broadcast service enterpriser is not transmitted to the viewer with individual electronic program information of the broadcast service enterpriser. Therefore,  
20 electronic program information of each broadcast service enterpriser is not transmitted in duplicate.

It is also applicable that the electronic program information preparing means comprise:

common electronic program information preparing means for  
25 preparing common electronic program information common to the

pieces of electronic program information of the broadcast service enterprisers from the pieces of electronic program information of the broadcast service enterprisers;

non-common electronic program information preparing means  
5 for preparing first non-common electronic program information not common to the broadcast service enterprisers on the individual level from the electronic program information of one broadcast service enterpriser for each broadcast service enterpriser and preparing second non-common electronic program  
10 information not common to the broadcast service enterprisers on the general level from the electronic program information of one broadcast service enterpriser for each broadcast service enterpriser, and  
the electronic program information transmitting means  
15 comprises:

electronic program information multiplexing means for multiplexing the common electronic program information prepared by the common electronic program information preparing means, one piece of first non-common electronic  
20 program information of a particular broadcast service enterpriser prepared by the non-common electronic program information preparing means and pieces of second non-common electronic program information of broadcast service enterprisers other than the particular broadcast service  
25 enterpriser with each other to produce multiplexed electronic

program information for each particular broadcast service enterpriser; and

multiplexed electronic program information transmitting means for transmitting the multiplexed electronic program information produced by the electronic program information multiplexing means to the viewer for each particular broadcast service enterpriser.

In the above configuration, common electronic program information common to the pieces of electronic program information of the broadcast service enterprisers is prepared from the pieces of electronic program information of the broadcast service enterprisers in the common electronic program information preparing means. Accordingly, each particular broadcast service enterpriser is not required to 15 prepare the common electronic program information.

It is also preferred that a plurality of channel services be listed in the general electronic program information or in the individual electronic program information of one broadcast service enterpriser prepared by the electronic program information preparing means, and service specifying information indicating the specifying of a particular channel service is arranged in the general electronic program information or the individual electronic program information of the broadcast service enterpriser to automatically select 25 the particular channel service from the channel services in

cases where the broadcast service enterpriser is selected.

In the above configuration, even though each broadcast service enterpriser provides a plurality of channel services, when a viewer selects one broadcast service enterpriser, a particular channel service of the broadcast service enterpriser is automatically specified according to the service specifying information. Accordingly, each broadcast service enterpriser can make the viewer automatically watch a television program of the particular channel service recommended by the broadcast service enterpriser.

It is also preferred that pieces of information of a plurality of television programs be described in the individual electronic program information or the general electronic program information and program link describing information indicating that an actual television program actually broadcasted is the same as one or more virtual television programs not actually broadcasted be arranged in the individual electronic program information or the general electronic program information..

In the above configuration, in cases where a high definition television (HDTV) program is provided, because the HDTV program extends over a plurality of television channels, the HDTV program of one television channel is actually broadcasted as an actual television program, and the HDTV program of the other television channels is not actually

broadcasted as a virtual television program. In this case, program link describing information (or event link information) arranged in the general electronic program information or the individual electronic program information 5 indicates that the virtual television programs are the same as the actual television program.

It is also preferred that pieces of information of one or more television programs are listed in the general electronic program information or the individual electronic program 10 information of each broadcast service enterpriser prepared by the electronic program information preparing means and a transmission bandwidth be described as the information of each television program.

In the above configuration, a transmission bandwidth 15 indicating a display quality be described as the information of each television program in the general electronic program information or the individual electronic program information. Therefore, the viewer can select one of the television programs according to the transmission bandwidth.

20 It is also preferred that information of one broadcast service enterpriser, information of a broadcasting schedule and information of a television channel be described as the information of each television program to produce a three-dimensional electronic program guide in which a display width 25 of each television program is proportional to the transmission

bandwidth of the television program.

In the above configuration, information of one broadcast service enterpriser, information of a broadcasting schedule and information of a television channel are described as the 5 information of each television program. Therefore, a three-dimensional electronic program guide, in which a display width of each television program is proportional to the transmission bandwidth of the television program, can be produced.

Accordingly, the viewer can easily select a television program 10 while watching the three-dimensional electronic program guide.

It is also preferred that one or more main channel services and one or more sub-channel services subordinate to one main channel service be hierarchically listed in the general electronic program information or in the individual electronic 15 program information of each broadcast service enterpriser prepared by the electronic program information preparing means.

It is also preferred that one or more main television programs and one or more sub-television programs subordinate 20 to one main television program are hierarchically listed in the general electronic program information or the individual electronic program information of each broadcast service enterpriser prepared by the electronic program information preparing means.

25 In the above configuration, the main channel services (or

the main television programs) and the sub-channel services (or the sub-television programs) are hierarchically listed in the general electronic program information or in the individual electronic program information. Therefore, even though a large 5 number of channel services (or television programs) are provided by one broadcast service enterpriser, an electronic program guide, in which the channel services (or television programs) are hierarchically arranged, can be easily produced. Accordingly, the viewer can easily select one channel service 10 (or one television program) from the channel services (or television programs) of the electronic program guide.

It is also preferred that the general electronic program information including information of the main channel services be carried in all transport streams and the individual 15 electronic program information including information of the sub-channel services be carried in a particular transport stream in which television programs of the sub-channel services are actually carried.

In the above configuration, because information of the main 20 channel services is carried in all transport streams of all broadcast service enterprisers, the information of the main channel services arranged in a common electronic program table can be displayed regardless of any broadcast service enterpriser selected by the viewer. Also, because information 25 of the sub-channel services is carried in a particular

transport stream in which television programs of the sub-channel services are actually carried, when the viewer selects a particular broadcast service enterpriser corresponding to the sub-channel services, the information of the sub-channel 5 services arranged in an individual electronic program table can be displayed.

It is also preferred that television programs provided by a particular broadcast service enterpriser be carried in a plurality of particular transport streams, television programs 10 of the sub-channel services be carried in one particular transport stream, the general electronic program information including information of the main channel services be carried in all transport streams and the individual electronic program information including information of the sub-channel services 15 be carried in each of the particular transport streams.

In the above configuration, in cases where a plurality of particular transport streams correspond to a plurality of channel services of a particular broadcast service enterpriser, information of the sub-channel services provided 20 by the particular broadcast service enterpriser is carried in each of the particular transport streams. Therefore, even though the viewer selects any of the channel services of the particular broadcast service enterpriser, the information of the sub-channel services arranged in an individual electronic 25 program table can be displayed.

The second object of the present invention is provided by an electronic program guide producing apparatus, comprising:

5 electronic program information receiving means for receiving electronic program information of a plurality of broadcast service enterprisers;

10 common electronic program guide producing means for producing a common electronic program guide of channel services provided by the broadcast service enterprisers from the electronic program information of the broadcast service enterprisers received by the electronic program information receiving means; and

15 individual electronic program guide producing means for producing an individual electronic program guide of channel services provided by one broadcast service enterpriser from the electronic program information of the broadcast service enterpriser received by the electronic program information receiving means for each broadcast service enterpriser.

In the above configuration, a common electronic program guide of channel services provided by the broadcast service enterprisers is produced from the pieces of general electronic program information of the broadcast service enterprisers, and an individual electronic program guide of channel services provided by each broadcast service enterpriser is produced from the individual electronic program information of the broadcast service enterpriser.

Accordingly, the viewer can watch the common electronic program guide displayed on a displaying unit. Also, the viewer can watch the individual electronic program guide displayed on the displaying unit.

5       Also, because the individual electronic program guide of all broadcast service enterprisers is not produced but the individual electronic program guide of each broadcast service enterpriser is produced and displayed with a television program of the broadcast service enterpriser, a data 10 transmission band required for the individual electronic program guide displayed can be effectively used.

It is preferred that the electronic program guide producing apparatus further comprise:

displaying means for displaying a television program of a 15 channel service provided by a particular broadcast service enterpriser selected from the broadcast service enterprisers, displaying the common electronic program guide produced by the common electronic program guide producing means regardless of the particular broadcast service enterpriser, and displaying a 20 particular individual electronic program guide of the particular broadcast service enterpriser produced by the individual electronic program guide producing means while displaying the television program of the channel service provided by the particular broadcast service enterpriser.

25       In the above configuration, the common electronic program

guide is displayed by the displaying means regardless of the broadcast service enterpriser of the television program displayed by the displaying means. Also, the particular individual electronic program guide of the particular 5 broadcast service enterpriser is displayed only when one television program of the channel service provided by the particular broadcast service enterpriser is displayed.

Accordingly, the common electronic program guide can be displayed any time. Also, the individual electronic program 10 guide of each broadcast service enterpriser can be displayed when a television program provided by the broadcast service enterpriser is displayed. Therefore, there is no probability that an individual electronic program guide of a broadcast service enterpriser other than the particular broadcast 15 service enterpriser providing the television program currently displayed by the displaying means is erroneously displayed, so that a trouble between broadcast service enterprisers can be avoided.

It is also preferred that a plurality of channel services 20 be listed in the electronic program information of one broadcast service enterpriser received by the electronic program information receiving means, service specifying information indicating the specifying of a particular channel service selected from the channel services be arranged in the 25 electronic program information, and a television program of

the particular channel service of the broadcast service enterpriser be automatically displayed by the displaying means in cases where the viewer selects the broadcast service enterpriser.

5       In the above configuration, even though each broadcast service enterpriser provides a plurality of channel services, when a viewer selects one broadcast service enterpriser, a particular channel service of the broadcast service enterpriser is automatically specified according to the 10 service specifying information. Accordingly, each broadcast service enterpriser can make the viewer automatically watch a television program of the particular channel service recommended by the broadcast service enterpriser.

It is also preferred that a plurality of channel services 15 be listed in one individual electronic program guide produced by the individual electronic program guide producing means or in the common electronic program guide produced by the common electronic program guide producing means, a viewer attribute be arranged as information of each channel service of the 20 individual electronic program guide or the common electronic program guide, and a television program of a particular channel service of the broadcast service enterpriser be automatically displayed by the displaying means in cases where the viewer attribute of the particular channel service agrees 25 with an attribute of the viewer in the individual electronic

program guide or the common electronic program guide.

In the above configuration, each broadcast service enterpriser provides a plurality of channel services, and a viewer attribute is arranged as information of each channel service of the individual electronic program guide or the common electronic program guide. Therefore, when a viewer selects one broadcast service enterpriser, a particular channel service, of which the viewer attribute agrees with an attribute of the viewer in the individual electronic program guide or the common electronic program guide, is automatically selected, and a television program of the particular channel service of the broadcast service enterpriser is displayed. Accordingly, each broadcast service enterpriser can make the viewer automatically watch the television program of the particular channel service recommended by the broadcast service enterpriser.

It is also preferred that a plurality of channel services be listed in one individual electronic program guide produced by the individual electronic program guide producing means or in the common electronic program guide produced by the common electronic program guide producing means, a genre be arranged as information of each channel service of the individual electronic program guide or the common electronic program guide, and a television program of a particular channel service of the broadcast service enterpriser be automatically

displayed by the displaying means in cases where the genre of the particular channel service agrees with a viewer favorite genre in the individual electronic program guide or the common electronic program guide.

5       In the above configuration, each broadcast service enterpriser provides a plurality of channel services, and a genre is arranged as information of each channel service of the individual electronic program guide or the common electronic program guide. Therefore, when a viewer selects one  
10 broadcast service enterpriser, a particular channel service, of which the genre agrees with a viewer favorite genre in the individual electronic program guide or the common electronic program guide of the broadcast service enterpriser, is automatically selected, and a television program of the  
15 particular channel service of the broadcast service enterpriser is displayed. Accordingly, each broadcast service enterpriser can make the viewer automatically watch the television program of the particular channel service recommended by the broadcast service enterpriser.

20      It is also preferred that pieces of information of a plurality of television programs be described in one individual electronic program guide produced by the individual electronic program guide producing means or in the common electronic program guide produced by the common electronic  
25 program guide producing means, program link describing

information indicating that an actual television program  
actually broadcasted is the same as one or more virtual  
television programs not actually broadcasted be arranged in  
the individual electronic program guide or the common  
5 electronic program guide, and the individual electronic  
program guide or the common electronic program information be  
displayed by the displaying means.

In the above configuration, in cases where a high  
definition television (HDTV) program is provided, because the  
10 HDTV program extends over a plurality of television channels,  
the HDTV program of one television channel is actually  
broadcasted as an actual television program, and the HDTV  
program of the other television channels is not actually  
broadcasted as a virtual television program. In this case,  
15 program link describing information is described in the  
individual electronic program guide or the common electronic  
program guide to indicate that the virtual television programs  
are the same as the actual television program. Therefore, the  
viewer can recognize the virtual television programs, and the  
20 viewer can select the HDTV program without any trouble.

It is also preferred that information of a particular  
program extending over a plurality of television channels be  
described in one individual electronic program guide produced  
by the individual electronic program guide producing means or  
25 in the common electronic program guide produced by the common

electronic program guide producing means and the information of the particular program be displayed by the displaying means as the individual electronic program guide or the common electronic program guide.

5       In the above configuration, even though a particular program extending over a plurality of television channels is broadcasted, information of the particular program is displayed as the individual electronic program guide. Therefore, the viewer can recognize the particular program  
10      extending over the television channels by watching the individual electronic program guide.

It is also preferred that information of a particular television program extending over a plurality of television channels be described in one individual electronic program  
15      guide produced by the individual electronic program guide producing means or the common electronic program guide produced by the common electronic program guide producing means, the information of the particular television program be described in each television channel of the individual  
20      electronic program guide or the common electronic program guide, the information of the particular television program described in each television channel be displayed by the displaying means as the individual electronic program guide or the common electronic program guide, and the selection of the  
25      particular television program be visually indicated in each

television channel in cases where the particular television program of one television channel is selected.

In the above configuration, even though a particular program extending over a plurality of television channels is 5 broadcasted, information of the particular television program is described in each television channel and is displayed as the individual electronic program guide or the common electronic program guide. Thereafter, when the viewer selects the particular television program of one television channel, 10 the selection of the particular television program is visually indicated in each television channel. Therefore, the viewer can easily recognize the television channels corresponding to the particular program.

It is also preferred that display quality information be 15 described as information of each television program in one individual electronic program guide produced by the individual electronic program guide producing means or in the common electronic program guide produced by the common electronic program guide producing means to indicate a display quality of 20 the television program and pieces of information of the television programs be displayed by the displaying means as the individual electronic program guide or the common electronic program guide to indicate the display quality of each television program according to the display quality 25 information of the television program.

In the above configuration, display quality information indicating a display quality of each television program is described as information of the television program in one individual electronic program guide or the common electronic 5 program guide, and the display quality information of the television programs are displayed. Therefore, the viewer can select one of the television programs while referring the display quality information.

It is also preferred that information of one broadcast 10 service enterpriser, information of a schedule and information of a television channel be described as information of each television program in one individual electronic program guide produced by the individual electronic program guide producing means or in the common electronic program guide produced by 15 the common electronic program guide producing means, a transmission bandwidth be described as information of each television program in the individual electronic program guide or the common electronic program guide, and a three-dimensional electronic program guide composed of three 20 components of the broadcast service enterpriser, the schedule and the television channel be displayed by the displaying means on condition that a display width of each television program in the three-dimensional electronic program guide is proportional to the transmission bandwidth of the television 25 program.

In the above configuration, information of one broadcast service enterpriser, information of a broadcasting schedule and information of a television channel are described as the information of each television program in one individual

5 electronic program guide, a transmission bandwidth indicating a display quality of each television program is described as information of the television program in the individual electronic program guide or in the common electronic program guide, and a three-dimensional electronic program guide, in

10 which a display width of each television program is proportional to the transmission bandwidth of the television program, is displayed. Accordingly, the viewer can easily select a television program while watching the three-dimensional electronic program guide.

15 It is also preferred that information of television programs be described in one individual electronic program guide produced by the individual electronic program guide producing means or in the common electronic program guide produced by the common electronic program guide producing

20 means, the information of the television programs be displayed by the displaying means as the individual electronic program guide or the common electronic program guide while displaying a television program of one television channel, and the electronic program guide producing apparatus, further

25 comprise:

television channel changing means for changing a television program of a first television channel to a television program of a second television channel in cases where the television program of the first television channel has no relationship 5 with the television program of the second television channel and changing the television program of the first television channel to a television program of a third television channel in cases where the television program of the first television channel refers to the information of the television program of the second television channel, the television program of the second television channel refers to the information of the television program of the first television channel or the television programs of the first and second television channels refers to the information of a television program of 10 one television channel. 15

In the above configuration, a plurality of television channels are normally selected by the television channel changing means one after another in the predetermined order. However, in cases where the television program of a first 20 television channel has relationship with the television program of a second television channel, the change from the first television channel to the second television channel is not performed. In detail, in cases where the television program of the first television channel refers to the 25 information of the television program of the second television

channel, the television program of the second television channel refers to the information of the television program of the first television channel or the television programs of the first and second television channels refers to the information 5 of a television program of one television channel, the second television channel is not selected but a third television channel is selected.

Accordingly, because the first television channel is automatically changed to the third television channel, the 10 viewer is not required to select the third television channel having no relationship with the television program of the first television channel by repeatedly operating the television channel changing means. Therefore, the viewer can rapidly select a next television program having no 15 relationship with the television program of a previously-selected television channel.

It is also preferred that channel identifying information indicating the second television channel or the third television channel changed by the television channel changing 20 means and one or more fourth television channels be displayed in cases where the second television channel or the third television channel and the fourth television channels refer to information of the same television channel, and channel identifying information indicating the second television 25 channel or the third television channel changed by the

television channel changing means and one or more fifth television channels be displayed in cases where the fifth television channels refer to information of the second television channel or information of the third television

5 channel.

In the above configuration, the first television channel is changed to the second television channel (or the third television channel) by the television channel changing means.

In cases where the second television channel (or the third television channel) and one or more fourth television channels refer to information of one television channel, channel identifying information indicating the second television channel (or the third television channel) and the fourth television channels is displayed. Also, in cases where one or

10 more fifth television channels refer to information of the second television channel (or information of the third television channel), channel identifying information indicating the second television channel (or the third television channel) and the fifth television channels is

15 displayed.

20

It is also preferred that information of one or more main channel services and information of one or more sub-channel services subordinate to one main channel service be hierarchically described in one individual electronic program

25 guide produced by the individual electronic program guide

producing means or in the common electronic program guide produced by the common electronic program guide producing means, and the information of the main channel services and the information of the sub-channel services hierarchically 5 described be displayed by the displaying means as the individual electronic program guide or the common electronic program guide.

It is also preferred that information of one or more main television programs and information of one or more sub- 10 television programs subordinate to one main television program be hierarchically described in one individual electronic program guide produced by the individual electronic program guide producing means or the common electronic program guide produced by the common electronic program guide producing 15 means, and the information of the main television programs and the information of the sub-television programs hierarchically described be displayed by the displaying means as the individual electronic program guide or the common electronic program guide.

20 In the above configuration, information of the main channel services (or the main television programs) and information of the sub-channel services (or the sub-television programs) are hierarchically described in one individual electronic program guide or the common electronic program guide and are 25 displayed. Therefore, even though a large number of channel

services (or television programs) are provided by one broadcast service enterpriser, an electronic program guide, in which the channel services (or television programs) are hierarchically arranged, can be easily produced. Accordingly, 5 the viewer can easily select one channel service (or one television program) from the channel services (or television programs) of the electronic program guide.

It is also preferred that information of a main television program and information of one or more sub-television programs 10 subordinate to the main television program be hierarchically described in one individual electronic program guide produced by the individual electronic program guide producing means or the common electronic program guide produced by the common electronic program guide producing means, the information of 15 the main television programs be displayed by the displaying means as the individual electronic program guide, and the information of the sub-television programs be displayed by the displaying means as the individual electronic program guide or the common electronic program guide in cases where the main 20 television program or a channel service of the main television program described in the information of the main television programs is selected.

In the above configuration, when information of the main television program or a channel service of the main television 25 program described in the information of the main television

programs is selected by the viewer, the information of the sub-television programs subordinate to the main television program is automatically displayed. Therefore, the viewer is not required to select each of the sub-television programs.

5        It is also preferred that information of a main television program and information of one or more sub-television programs subordinate to the main television program be hierarchically described in one individual electronic program guide produced by the individual electronic program guide producing means or  
10      the common electronic program guide produced by the common electronic program guide producing means, a viewer attribute be described as information of each sub-television program, and a particular sub-television program be automatically displayed by the displaying means, on condition that the  
15      viewer attribute described as the information of the particular sub-television program agrees with an attribute of the viewer, in cases where the viewer selects the main television program.

          In the above configuration, when the viewer selects the  
20      information of the main television program, a particular sub-television program is selected from among the sub-television programs subordinate to the main television program on condition that the viewer attribute of the particular sub-television program agrees with an attribute of the viewer, and  
25      the particular sub-television program is automatically

displayed. Therefore, the viewer can easily watch his most favorite television program.

It is also preferred that information of a main television program and information of one or more sub-television programs 5 subordinate to the main television program be hierarchically described in one individual electronic program guide produced by the individual electronic program guide producing means or the common electronic program guide produced by the common electronic program guide producing means, a genre be described 10 as information of each sub-television program, and a particular sub-television program be automatically displayed by the displaying means, on condition that the genre described as the information of the particular sub-television program agrees with a viewer favorite genre, in cases where the viewer 15 selects the main television program.

In the above configuration, when the viewer selects the information of the main television program, a particular sub-television program is selected from among the sub-television programs subordinate to the main television program on 20 condition that the genre of the particular sub-television program agrees with a viewer favorite genre, and the particular sub-television program is automatically displayed. Therefore, the viewer can easily watch his most favorite television program.

BRIEF DESCRIPTION OF THE DRAWINGS

The objects, features and advantages of the present invention will be apparent from the following description taken in conjunction with the accompanying drawings, in which:

5 Fig. 1 shows a configuration of a conventional digital broadcasting system composed of a broadcasting station center system and a plurality of viewer's terminals;

Fig. 2 is an explanatory view showing a total configuration of an electronic program information preparing and transmitting apparatus according to a first embodiment of the 10 present invention;

Fig. 3 shows an example of a service description table (SDT) of a channel service ST100 described on an individual level and an example of an event information table (EIT) of 15 the channel service ST100 described on the individual level;

Fig. 4 shows an example of a service description table (SDT) of a channel service ST100 described on a general level and an example of an event information table (EIT) of the channel service ST100 described on the general level;

20 Fig. 5 shows an example of a common electronic program guide of television programs provided by all broadcast service enterprisers;

Fig. 6 shows an example of an individual electronic program guide of television programs provided by a broadcast service 25 enterpriser;

Fig. 7 is an explanatory view showing a total configuration of an electronic program information preparing and transmitting apparatus according to a second embodiment of the present invention;

5 Fig. 8 is an explanatory view showing a total configuration of an electronic program information preparing and transmitting apparatus according to a third embodiment of the present invention;

10 Fig. 9 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to a fourth embodiment of the present invention;

15 Fig. 10 shows a bouquet association table (BAT) and a network information table (NIT) in case of digital video broadcasting (DVB) of European digital broadcast standards;

Fig. 11 shows a program association table (PAT) and a program map table (PMT) in case of MPEG2;

20 Fig. 12 shows an event information table (EIT) and a service description table (SDT) in case of digital video broadcasting (DVB) of European digital broadcast standards;

25 Fig. 13 shows one or more channel services, general electronic program information and non-common electronic program information transmitted to the receiving terminal apparatus including an electronic program information receiving apparatus as each transport stream;

Fig. 14 shows an example of an individual electronic program guide displayed according to the fourth embodiment;

Fig. 15 is a block diagram of an electronic program information receiving apparatus including an electronic program guide producing terminal according to a fifth embodiment of the present invention;

Fig. 16 shows two bouquet association tables (BATS) according to the fifth embodiment of the present invention;

Fig. 17 shows a television channel automatic selection, in which a television channel of a broadcasting station "Fujisan" is automatically changed to a particular television channel of a broadcasting station "Japan TV" according to a default flag attached to a channel service of the broadcasting station "Japan TV" when a viewer selects the broadcasting station "Japan TV", according to the fifth embodiment;

Fig. 18 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to a sixth embodiment of the present invention;

Fig. 19 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to a seventh embodiment of the present invention;

Fig. 20 shows an event information table EIT, in which event link information corresponding to an actual television

program actually broadcasted is not described in a column of the event link information and two event information tables EIT in which event link information corresponding to a virtual television program not actually broadcasted is described in a 5 column of the event link information, according to the seventh embodiment

Fig. 21 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to an eighth embodiment of 10 the present invention;

Fig. 22 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to a ninth embodiment of the present invention;

15 Fig. 23 shows a television program table, in which information of an HDTV program extending over three television channels adjacent to each other is described, according to the ninth embodiment;

Fig. 24 is a block diagram of an electronic program 20 information receiving terminal including an electronic program guide producing apparatus according to a tenth embodiment of the present invention;

Fig. 25 shows a television program table, in which 25 information of an HDTV program extending over three television channels separately positioned is highlighted, according to

the tenth embodiment;

Fig. 26 shows a plurality of event information tables EIT, in which bandwidth information is described for each television program, according to an eleventh embodiment of the 5 present invention;

Fig. 27 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to the eleventh embodiment of the present invention;

10 Fig. 28 shows a television program table, in which a display width for information of one television program is set for each television program, according to the eleventh embodiment;

Fig. 29 shows an electronic program table, in which a display width for television program information is set for 15 each television channel, according to a modification of the eleventh embodiment;

Fig. 30 shows a correspondence table indicating the correspondence between each channel service type and one display width according to a modification of the eleventh 20 embodiment;

Fig. 31 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to a twelfth embodiment of the present invention;

25 Fig. 32 shows an example of a three-dimensional electronic

program guide according to the twelfth embodiment;

Fig. 33 shows an example of an electronic program guide according to the twelfth embodiment;

Fig. 34 shows a plurality of television programs displayed 5 on a displaying unit one after another according to the twelfth embodiment;

Fig. 35 is a block diagram of an electronic program information receiving terminal including an electronic program 10 guide producing apparatus according to a thirteenth embodiment of the present invention;

Fig. 36 shows a plurality of television programs displayed on a displaying unit one after another according to the thirteenth embodiment;

Fig. 37 is a block diagram of an electronic program 15 information receiving terminal including an electronic program guide producing apparatus according to a fourteenth embodiment of the present invention;

Fig. 38 shows an example of main channel services and sub-channel services according to a fifteenth embodiment of the 20 present invention;

Fig. 39 shows an example of transport streams in which a plurality of channel services are carried;

Fig. 40 shows an example of a service description table SDT of main channel services;

25 Fig. 41 shows an example of a service description table SDT

of main channel services and sub-channel services;

Fig. 42 shows an example of an event information table EIT of a main channel service;

Fig. 43 shows an example of an event information table EIT 5 of another main channel service;

Fig. 44 shows an example of event information tables EIT of sub-channel services;

Fig. 45 is a block diagram of an electronic program 10 information receiving terminal including an electronic program guide producing apparatus according to the fifteenth embodiment;

Fig. 46 shows an example of transport streams in which a plurality of channel services and electronic program 15 information of the channel services are carried, according to a sixteenth embodiment of the present invention;

Fig. 47 is a block diagram of an electronic program information receiving terminal including an electronic program 20 guide producing apparatus according to the sixteenth embodiment;

Fig. 48 shows an example of transport streams in which a plurality of channel services and electronic program 25 information of the channel services are carried, according to a seventeenth embodiment of the present invention;

Fig. 49 is a block diagram of an electronic program 20 information receiving terminal including an electronic program

guide producing apparatus according to the seventeenth embodiment;

Fig. 50 is a block diagram of an electronic program information receiving terminal including an electronic program  
5 guide producing apparatus according to an eighteenth embodiment of the present invention;

Fig. 51A shows an example of an electronic program table of main channel services;

Fig. 51B shows an example of an electronic program table of  
10 sub-channel services;

Fig. 52 shows an example of a service description table SDT of main channel services and sub-channel services, according to a nineteenth embodiment of the present invention;

Fig. 53 is a block diagram of an electronic program  
15 information receiving terminal including an electronic program guide producing apparatus according to the nineteenth embodiment;

Fig. 54 shows an example of a service description table SDT of main channel services and sub-channel services, according  
20 to a twentieth embodiment of the present invention;

Fig. 55 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to the twentieth embodiment;

25 Fig. 56 shows an example of a service description table SDT

of main channel services and sub-channel services, according to a twenty-first embodiment of the present invention; and

Fig. 57 is a block diagram of an electronic program information receiving terminal including an electronic program 5 guide producing apparatus according to the twenty-first embodiment.

#### DETAILED DESCRIPTION OF THE EMBODIMENTS

Preferred embodiments of an electronic program information 10 preparing and transmitting apparatus and an electronic program guide producing apparatus according to the present invention are described with reference to the drawings.

(First Embodiment)

Fig. 2 is an explanatory view showing a total configuration 15 of an electronic program information preparing and transmitting apparatus placed in a broadcasting station center system according to a first embodiment of the present invention.

As shown in Fig. 2, an electronic program information 20 preparing and transmitting apparatus 10 placed in a broadcasting station center system comprises:

an electronic program information preparing unit 11 for preparing general electronic program information described on a general level from electronic program information of a 25 channel service provided by a broadcast service enterpriser

for each of a plurality of broadcast service enterprisers, preparing individual electronic program information described on an individual level from the electronic program information of the channel service of one broadcast service enterpriser

5 for each broadcast service enterpriser, and preparing TS specifying information indicating a transport stream for each channel service;

an electronic program information outputting unit 12 for outputting the pieces of general electronic program

10 information of the channel services prepared in the preparing unit 11, the pieces of individual electronic program information of the channel services prepared in the preparing unit 11 and the pieces of TS specifying information prepared in the preparing unit 11; and

15 an electronic program information multiplexing and modulating unit 13 for multiplexing and modulating one piece of individual electronic program information of a particular channel service of a particular broadcast service enterpriser and the pieces of general electronic program information of

20 the broadcast service enterprisers of channel services other than the particular channel service output from the outputting unit 12 to produce packets of combined electronic program information carried in a transport stream, which is indicated by the TS specifying information of the particular broadcast

25 service enterpriser, for each piece of individual electronic

program information, and transmitting the packets of each piece of combined electronic program information to a plurality of viewer's terminals.

In the above configuration, an operation performed in the 5 electronic program information preparing and transmitting apparatus 10 is described.

When each broadcast service enterpriser intends to provide electronic program information carried in a transport stream (TS) for a plurality of viewer's terminals, individual 10 electronic program information described on an individual level corresponding to a high detailed degree is prepared in an electronic program information preparing unit 11 for each channel service (or each television channel) of television programs provided by one broadcast service enterpriser 15 according to both electronic program information detailed degree setting information I1 and enterpriser service correspondence information I2. The individual level corresponds to a high detailed degree. Also, general electronic program information described on a general level is 20 prepared in an electronic program information preparing unit 11 for each channel service of television programs provided by one broadcast service enterpriser according to the electronic program information detailed degree setting information I1 and the enterpriser service correspondence information I2. The 25 general level corresponds to a low detailed degree. The

individual electronic program information described on the individual level and the general electronic program information described on the general level are prepared for each broadcast service enterpriser.

5        Electronic program information corresponding to one channel service of one or more television programs provided by one broadcast service enterpriser indicates guide (or attribute) information of the television programs and is carried in one transport stream. The electronic program information detailed  
10      degree setting information I1 indicates a detailed degree for contents of the individual electronic program information described on the individual level and a detailed degree for contents of the general electronic program information described on the general level. The enterpriser service  
15      correspondence information I2 indicates the correspondence between each broadcast service enterpriser and one channel service carried in one transport stream, and the information I2 is included in television program scheduling information I3. Each transport stream corresponds to one or more channel  
20      services selected by each viewer.

          In general, each broadcast service enterpriser desires to make a viewer watch detailed contents of electronic program information of one or more television programs provided by the broadcast service enterpriser when the viewer selects a  
25      particular channel service (or a particular television

channel) of the broadcast service enterpriser, and each broadcast service enterpriser desires to make a viewer watch brief contents of electronic program information of one or more television programs provided by the broadcast service 5 enterpriser when the viewer selects a channel service (or a television channel) of another broadcast service enterpriser.

Therefore, in cases where particular electronic program information provided by a particular broadcast service enterpriser is carried in a particular transport stream 10 corresponding to the particular broadcast service enterpriser and is transmitted to the viewer's terminals, the particular electronic program information prepared on the individual level is carried in a particular transport stream of the particular broadcast service enterpriser and is transmitted to 15 the viewer's terminals. In contrast, in cases where particular electronic program information provided by a particular broadcast service enterpriser is carried in each of transport streams other than a particular transport stream of the particular broadcast service enterpriser and is transmitted to 20 the viewer's terminals, the particular electronic program information prepared on the general level is carried in each of transport streams other than the particular transport stream and is transmitted to the viewer's terminals.

In the electronic program information preparing unit 11, a 25 service description table (SDT) and an event information table

(EIT) are prepared as electronic program information corresponding to each channel service. The service description table SDT is prepared according to the enterpriser service correspondence information I2, and the event information table 5 EIT is prepared according to the television program scheduling information I3 and the electronic program information detailed degree setting information I1.

In the electronic program information detailed degree setting information I1, detailed contents of the electronic 10 program information described on the individual level and brief contents of the electronic program information described on the general level are set for each channel service. For example, in case of the electronic program information described on the individual level for a channel service ST100, 15 detailed guide information of a broadcast service enterpriser is listed on the individual level in the service description table SDT corresponding to the channel service ST100 of the broadcast service enterpriser, and detailed guide information of a plurality of television programs covering over 7 days is listed on the individual level in the event information table 20 corresponding to the channel service ST100 of the broadcast service enterpriser. The service description table and the event information table described on the individual level for the channel service ST100 are, for example, shown in Fig. 3. 25 Also, as the electronic program information described on the

general level for the channel service ST100, brief guide information of the broadcast service enterpriser is listed on the general level in the service description table SDT corresponding to the channel service ST100 of the broadcast service enterpriser, and brief guide information of a plurality of television programs in one day is listed on the individual level in the event information table corresponding to the channel service ST100 of the broadcast service enterpriser. The service description table and the event information table described on the general level for the channel service ST100 are, for example, shown in Fig. 4.

In the same manner, the electronic program information of a plurality of television programs covering over 14 days is described on the individual level for a channel service ST101 of the television programs, and the electronic program information of a plurality of television programs in one day is described on the general level for the channel service ST101.

In addition to the electronic program information, TS specifying information, which indicates a particular transport stream corresponding to the individual electronic program information described on the individual level, is prepared according to the enterpriser service correspondence information I2 for each channel service. For example, as shown in Fig. 2, because a comment "the channel service ST100 is

carried in a transport stream TS1 and the channel service ST101 is carried in a transport stream TS10" is described in the enterpriser service correspondence information I2, the TS specifying information indicates

- 5     (1) the transport stream TS1 for the electronic program information which is described on the individual level for the channel service ST100,
- (2) transport streams other than the transport stream TS1 for the electronic program information which is described on the general level for the channel service ST100,
- 10    (3) the transport stream TS10 for the electronic program information which is described on the individual level for the channel service ST101, and
- (4) transport streams other than the transport stream TS10 for the electronic program information which is described on the general level for the channel service ST101.

The pieces of individual electronic program information described on the individual level, the pieces of general electronic program information described on the general level and the pieces of TS specifying information prepared in the electronic program information preparing unit 11 are sent to the electronic program information multiplexing and modulating unit 13 through the electronic program information outputting unit 12.

25     In the multiplexing and modulating unit 13, each piece of

individual electronic program information, which is described on the individual level for a particular channel service of a particular broadcast service enterpriser, is multiplexed with pieces of general electronic program information described on 5 the general level for channel services of broadcast service enterprisers other than the particular broadcast service enterpriser and are carried in a particular transport stream specified by TS specifying information corresponding to the individual electronic program information described on the 10 individual level.

For example, in cases where the channel service ST100 corresponds to guide information of a plurality of first television programs carried in the transport stream TS1 and in cases where the channel service ST101 corresponds to guide 15 information of a plurality of second television programs carried in the transport stream TS10, the electronic program information (SDT and EIT described in detail) described on the individual level for the channel service ST100 and the electronic program information (SDT and EIT simply described) 20 described on the general level for the channel service ST101 are multiplexed with each other to be carried in the transport stream TS1 corresponding to the first television programs and are transmitted to the viewer's terminal, the electronic program information (SDT and EIT described in detail) 25 described on the individual level for the channel service

ST101 and the electronic program information (SDT and EIT simply described) described on the general level for the channel service ST100 are multiplexed with each other to be carried in the transport stream TS10 corresponding to the 5 second television programs and are transmitted to the viewer's terminal, and the electronic program information (SDT and EIT simply described) described on the general level for the channel services ST100 and ST101 are multiplexed with each other to be carried in each of transport streams, which 10 correspond to other television programs, other than the transport streams TS1 and TS10 and are transmitted to the viewer's terminal.

Accordingly, because individual electronic program information corresponding to all channel services provided by 15 all broadcast service enterprisers is not prepared but individual electronic program information corresponding to one channel service of one television program provided by one broadcast service enterpriser is prepared and carried in one transport stream, a data transmission band required for each 20 broadcast service enterpriser can be effectively used.

Also, detail contents of the electronic program information corresponding to a channel service of one or more television programs provided by a particular broadcast service enterpriser are carried in a particular transport stream and 25 can be transmitted to the viewer's terminals, and brief

contents of the electronic program information corresponding to the channel service of the television programs provided by the particular broadcast service enterpriser are carried in each of transport streams other than the particular transport stream and are transmitted to the viewer's terminals.

Therefore, when the viewer selects a particular television channel corresponding to the particular transport stream of the particular broadcast service enterpriser, the viewer can watch detail contents of the electronic program information of the television programs provided by the particular broadcast service enterpriser. In contrast, when the viewer selects a television channel not corresponding to the particular transport stream of the particular broadcast service enterpriser, the viewer watches brief contents of the electronic program information of the television programs provided by the particular broadcast service enterpriser.

In this embodiment, each broadcast service enterpriser provides only a group of television programs of one channel service (or one television channel). However, it is applicable that each broadcast service enterpriser provide groups of television programs of one or more channel services respectively carried in one transport stream. For example, in cases where a comment "a channel service ST100 of a broadcast service enterpriser "Fujisan" is carried in a transport stream TS1, a channel service ST102 of the broadcast service

enterpriser "Fujisan" is carried in a transport stream TS3 and the channel service ST101 of a broadcast service enterpriser "Japan TV" is carried in a transport stream TS10" is described in the enterpriser service correspondence information I2,

5 (1) electronic program information (SDT and EIT described in detail) described on the individual level for the channel service ST100 is carried in each of the transport streams TS1 and TS3 of the broadcast service enterpriser "Fujisan",  
10 (2) electronic program information (SDT and EIT simply described) described on the general level for the channel service ST100 is carried in each of transport streams other than the transport streams TS1 and TS3,  
15 (3) electronic program information (SDT and EIT described in detail) described on the individual level for the channel service ST101 is carried in the transport stream TS10 of the broadcast service enterpriser "Japan TV",  
20 (4) general electronic program information (SDT and EIT simply described) described on the general level for the channel service ST101 is carried in each of transport streams other than the transport stream TS10,  
25 (5) individual electronic program information (SDT and EIT described in detail) described on the individual level for the channel service ST102 is carried in each of the transport streams TS1 and TS3 of the broadcast service enterpriser "Fujisan", and

(6) general electronic program information (SDT and EIT simply described) described on the general level for the channel service ST102 is carried in each of transport streams other than the transport streams TS1 and TS3.

5        Accordingly, detail contents of the electronic program information corresponding to a channel service of all television programs provided by a particular broadcast service enterpriser can be carried in each of one or more particular transport streams of the particular broadcast service  
10      enterpriser and can be transmitted to the viewer's terminals, and brief contents of the electronic program information corresponding to the channel service of the television programs provided by the particular broadcast service enterpriser are carried in each of transport streams other  
15      than the particular transport streams of the particular broadcast service enterpriser and are transmitted to the viewer's terminals .

Also, because brief contents of the general electronic program information corresponding to a plurality of channel services of a plurality of broadcast service enterprisers other than a particular broadcast service enterpriser can be obtained in each viewer's terminal, in cases where pieces of general electronic program information of the general level carried in transport streams of broadcast service enterprisers  
25      are gathered, a common electronic program guide of the

television programs provided by all broadcast service enterprisers can be produced in each viewer's terminal. For example, as shown in Fig. 5, pieces of electronic program information of the general level provided by broadcast service enterprisers "Japan TV", "NHK", "TVS" and "Sun TV" are carried in a transport stream of a broadcast service enterpriser "Fujisan", pieces of electronic program information of the general level provided by broadcast service enterprisers "Fujisan", "NHK", "TVS" and "Sun TV" are carried in a transport stream of a broadcast service enterpriser "Japan TV", so that a common electronic program guide of the television programs provided by all broadcast service enterprisers "Fujisan", "Japan TV", "NHK", "TVS" and "Sun TV" can be produced from the pieces of electronic program information of the general level provided by all broadcast service enterprisers "Fujisan", "Japan TV", "NHK", "TVS" and "Sun TV".

Also, because detailed contents of the electronic program information corresponding to all channel services of a particular broadcast service enterpriser can be obtained in each viewer's terminal for each particular broadcast service enterpriser, an individual electronic program guide of the television programs provided by one broadcast service enterpriser can be produced from the individual electronic program information of the broadcast service enterpriser

described on the individual level in each viewer's terminal for each broadcast service enterpriser. For example, as shown in Fig. 6, when a viewer selects a television channel of the broadcast service enterpriser "TVS", electronic program 5 information of the individual level provided by the broadcast service enterpriser "TVS" is received in the viewer's terminal, an individual electronic program guide of the television programs provided by the broadcast service enterpriser "TVS" can be produced from the electronic program 10 information of the individual level provided by the broadcast service enterpriser "TVS".

Also, in this embodiment, the electronic program information detailed degree setting information I1 sets detailed contents of the electronic program information described on the 15 individual level and brief contents of the electronic program information described on the general level for each channel service. However, it is applicable that the television program scheduling information I3 set detailed contents of the electronic program information described on the individual 20 level and brief contents of the electronic program information described on the general level for each channel service.

(Second Embodiment)

In this embodiment, electronic program information is prepared in a preparing unit for each broadcast service 25 enterpriser.

Fig. 7 is an explanatory view showing a total configuration of an electronic program information preparing and transmitting apparatus placed in a broadcasting station center system according to a second embodiment of the present 5 invention.

As shown in Fig. 7, an electronic program information preparing and transmitting apparatus 20 placed in a broadcasting station center system comprises the electronic program information preparing unit 11 and the 10 electronic program information outputting unit 12 arranged for each broadcast service enterpriser;

an electronic program information combining unit 21 for receiving the pieces of electronic program information and pieces of TS specifying information from the preparing units 15 11 of all broadcast service enterprisers and combining the electronic program information described on an individual level with one or more pieces of electronic program information described on general levels for each piece of electronic program information described on the individual 20 level; and

an electronic program information multiplexing and modulating unit 22 for multiplexing and modulating each set of electronic program information described on an individual level and pieces of electronic program information described 25 on general levels combined by the combining unit 21 to produce

5        packets of electronic program information carried in a transport stream indicated by the TS specifying information corresponding to the electronic program information described on the individual level and transmitting the packets to viewer's terminals.

      In the above configuration, an operation performed in the electronic program information preparing and transmitting apparatus 20 is described.

      In each electronic program information preparing unit 11, a 10 service description table (SDT) and an event information table (EIT) corresponding to electronic program information described on an individual level are prepared for each channel service of one broadcast service enterpriser according to electronic program information detailed degree setting 15 information I1 and television program scheduling information I3 of the broadcast service enterpriser, independent of the preparation of other pieces of electronic program information performed in other electronic program information preparing units 11. In this case, a detailed degree for the electronic 20 program information described on the individual level is determined by each broadcast service enterpriser, so that the detailed degree of the individual level is not fixed.

      Also, a service description table (SDT) and an event information table (EIT) are prepared as an additional portion 25 of electronic program information described on a general level

for the channel service of the broadcast service enterpriser in each electronic program information preparing unit 11 according to the electronic program information detailed degree setting information I1 and the television program 5 scheduling information I3 of the broadcast service enterpriser. In this case, a detailed degree for the electronic program information described on the general level is determined by each broadcast service enterpriser, so that the detailed degree of the general level is not fixed.

10 Also, TS specifying information indicating the transport stream of the broadcast service enterpriser is prepared in each electronic program information preparing unit 11. The electronic program information described on an individual level, the electronic program information described on a 15 general level and the TS specifying information prepared in each electronic program information preparing unit 11 are sent to the electronic program information combining unit 21 through the electronic program information outputting unit 12.

In the combining unit 21, enterpriser service 20 correspondence information I2 indicating the correspondence between each broadcast service enterpriser and the channel service is recorded, and particular electronic program information, which is described on an individual level for the channel service of a particular broadcast service enterpriser, 25 is combined with one or more pieces of electronic program

information, which are described on general levels for the channel services of one or more broadcast service enterprisers other than the particular broadcast service enterpriser, according to the enterpriser service correspondence

5 information I2 for each particular broadcast service enterpriser.

Thereafter, each set of the electronic program information described on an individual level and one or more pieces of electronic program information described on general levels is

10 sent with the TS specifying information corresponding to the electronic program information described on an individual level to the electronic program information multiplexing and modulating unit 22. In the multiplexing and modulating unit 22, each set of the electronic program information described

15 on an individual level and one or more pieces of electronic program information described on general levels is multiplexed and carried in a particular transport stream indicated by the TS specifying information corresponding to the electronic program information described on an individual level.

20 Accordingly, the electronic program information described on an individual level for a channel service of the particular broadcast service enterpriser can be carried with one or more pieces of electronic program information described on general levels for channel services of broadcast service enterprisers

25 other than the particular broadcast service enterpriser in the

particular transport stream corresponding to television programs provided by the particular broadcast service enterpriser, and the electronic program information described on the individual level and the electronic program information 5 described on the general levels are transmitted to viewer's terminals in the same manner as in the first embodiment.

Also, because each broadcast service enterpriser can prepare electronic program information independent of the preparation of other pieces of electronic program information 10 performed by other broadcast service enterprisers, even though the preparation of the other pieces of electronic program information is changed, each broadcast service enterpriser can prepare electronic program information without any adverse influence of the change in the other pieces of electronic 15 program information of the other broadcast service enterprisers.

Also, because the detailed degree for the electronic program information prepared by each broadcast service enterpriser is determined by the broadcast service 20 enterpriser, each broadcast service enterpriser can arbitrarily set the detailed degree for electronic program information described on an individual level and the detailed degree for electronic program information described on general level.

25 (Third Embodiment)

Contents of a part of electronic program information (or contents of common electronic program information) is common to all broadcast service enterprisers. In this embodiment, the common electronic program information is not prepared by each broadcast service enterpriser but is prepared in a common preparing unit, and electronic program information (or non-common electronic program information) other than the common electronic program information is prepared in the same manner as in the second embodiment.

Fig. 8 is an explanatory view showing a total configuration of an electronic program information preparing and transmitting apparatus placed in a broadcasting station center system according to a third embodiment of the present invention.

As shown in Fig. 8, an electronic program information preparing and transmitting apparatus 30 placed in a broadcasting station center system comprises:

- a common electronic program information preparing unit 31 for preparing contents (called common electronic program information) common to the pieces of electronic program information of all broadcast service enterprisers;
- a common electronic program information outputting unit 32 for outputting the common electronic program information;
- the electronic program information preparing unit 11 and the electronic program information outputting unit 12,

arranged for each broadcast service enterpriser, for preparing non-common electronic program information described on an individual level and non-common electronic program information described on a general level from contents of the piece of 5 electronic program information other than the common electronic program information for each broadcast service enterpriser and transmitting the pieces of non-common electronic program information;

an electronic program information combining unit 33 for 10 receiving the non-common electronic program information and TS specifying information from each of the outputting units 12 of all broadcast service enterprisers, receiving the common electronic program information from the outputting unit 32 and combining the non-common electronic program information, which 15 is described on an individual level for a channel service of a particular broadcast service enterpriser, with one or more pieces of non-common electronic program information, which are described on general levels for channel services of broadcast service enterprisers other than the particular broadcast 20 service enterpriser, and the common electronic program information for each piece of non-common electronic program information described on an individual level; and

an electronic program information multiplexing and modulating unit 34 for multiplexing and modulating each set of 25 non-common electronic program information described on an

individual level, pieces of non-common electronic program information described on general levels and the common electronic program information combined with each other by the combining unit 33 to produce packets of electronic program 5 information carried in a transport stream indicated by the TS specifying information corresponding to the non-common electronic program information described on the individual level and transmitting the packets to viewer's terminals.

In the above configuration, an operation performed in the 10 electronic program information preparing and transmitting apparatus 30 is described.

Contents (called common electronic program information) common to the pieces of electronic program information of all broadcast service enterprisers is prepared in a common 15 electronic program information preparing unit 31. For example, a network information table (NIT) and bouquet association table (BAT) are common to all broadcast service enterprisers because the NIT or BAT is hardly changed. In the NIT, tuning information used to select each of transport streams included 20 in a network is described. In the BAT, names of channel services of all broadcast service enterprisers, names of all transport streams including the channel services and names of bouquets are described in a list. Each bouquet corresponds to one broadcast service enterpriser.

25 Also, contents (called non-common electronic program

information) of electronic program information other than the common electronic program information are prepared in the electronic program information preparing unit 11 of each broadcast service enterpriser in the same manner as in the 5 second embodiment.

Thereafter, the common electronic program information prepared in the unit 31 is sent to the electronic program information combining unit 33 through the common electronic program information outputting unit 32, and each piece of non- 10 common electronic program information is sent to the electronic program information combining unit 33 through the electronic program information outputting unit 12.

In the combining unit 33, the non-common electronic program information, which is described on an individual level for the 15 channel service of a particular broadcast service enterpriser, pieces of non-common electronic program information, which are described on general levels for channel services of broadcast service enterprisers other than the particular broadcast service enterpriser, and the common electronic program 20 information for each particular broadcast service enterpriser are combined with each other. Thereafter, each set of the non-common electronic program information described on the individual level, the pieces of non-common electronic program 25 information described on the general levels and the common electronic program information combined with each other is

1        multiplexed and modulated in the multiplexing and modulating  
2        unit 34 to produce packets of electronic program information,  
3        and the packets are carried in a particular transform stream,  
4        which is specified by the TS specifying information  
5        corresponding to the non-common electronic program information  
6        described on the individual level and corresponds to one or  
7        more television programs provided by the particular broadcast  
8        service enterpriser, and are transmitted to the viewer's  
9        terminal.

10        Accordingly, because the common electronic program  
11        information common to all broadcast service enterprisers is  
12        not prepared in the electronic program information preparing  
13        unit 11 of each broadcast service enterpriser but is prepared  
14        in the common electronic program information preparing unit  
15        31, the preparation work of electronic program information  
16        performed by each broadcast service enterpriser can be  
17        reduced.

18        Also, in cases where a time and date table (TDT) is  
19        prepared by each broadcast service enterpriser, there is a  
20        probability that a time set by one broadcast service  
21        enterpriser differs from a time set by another broadcast  
22        service enterpriser. Therefore, it is applicable that the TDT  
23        be prepared in the common electronic program information  
24        preparing unit 31 as the common electronic program  
25        information.

(Fourth Embodiment)

In a digital broadcast system, video and audio signals indicating one or more television programs and a group of program specific information (PSI) tables prescribed according 5 to the MPEG2 (or a group of service information (SI) tables prescribed according to digital video broadcasting (DVB) of European digital broadcast standards) are multiplexed and modulated to produce a digital broadcast signal for each broadcast service enterpriser (or for each bouquet). Each 10 digital broadcast signal is composed of a plurality of packets, and each digital broadcast signal is carried in a transport stream and is transmitted to viewer's terminals. The PSI or SI is repeatedly transmitted to the viewer's terminals. When contents of the PSI or SI are renewed, a version number 15 attached to the PSI or SI is incremented.

Fig. 9 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to a fourth embodiment of the present invention.

20 As shown in Fig. 9, an electronic program information receiving terminal 40 comprises:  
an antenna 41 for receiving a plurality of digital broadcast signals transmitted from the electronic program information preparing and transmitting apparatus 10, 20 or 30, 25 each digital broadcast signal being carried in one transport

stream of one of a plurality of broadcast service enterprisers, and audio and video signals of television programs provided by each broadcast service enterpriser being included in the digital broadcast signal;

- 5        an electronic program guide producing apparatus 42 for selecting one of the digital broadcast signals received in the antenna 41, reproducing television programs from the selected digital broadcast signal and producing a common electronic program guide common to all broadcast service enterprisers and
- 10      an individual electronic program guide of each broadcast service enterpriser from the selected digital broadcast signal;

- 15      a remote control unit 43 for transmitting a remote control signal selected by a viewer to the electronic program guide producing apparatus 42 to control the operation of the apparatus 42; and
- 20      a displaying unit 44, such as a television monitor, for displaying the television programs reproduced in the apparatus 42, displaying the common electronic program guide any time (refer to Fig. 5), and displaying the individual electronic program guide of one broadcast service enterpriser (refer to Fig. 6) when a television program of a channel service provided by the broadcast service enterpriser is displayed.

The electronic program guide producing apparatus 42

- 25      comprises:

a remote control signal receiving unit 51 for receiving the remote control signal transmitted from the remote control unit 43;

5 a tuner 52 for tuning the digital broadcast signals received by the antenna 41 according to the remote control signal to select a particular digital broadcast signal of a particular broadcast service enterpriser from the digital broadcast signals;

10 a demodulating unit 53 for demodulating the particular digital broadcast signal selected in the tuner 52;

15 a demultiplexer 54 for demultiplexing the particular digital broadcast signal demodulated in the demodulating unit 53 to obtain video and audio signals, individual electronic program information of the particular broadcast service enterpriser and pieces of general electronic program information of broadcast service enterpriser other than the particular broadcast service enterpriser (a group of program specific information (PSI) tables or a group of service information (SI) tables) from the particular digital broadcast signal;

20 a section decoder 55 for decoding the PSI or SI of the electronic program information;

25 an electronic program information storing unit 56 for storing the pieces of general electronic program information and the individual electronic program information decoded in the section decoder 55 each time one digital broadcast signal is

selected in the tuner 52;

an audio-video (A/V) signal decoder 57 for decoding the video and audio signals obtained in the demultiplexer 54 and outputting the decoded video and audio signals to the

5 displaying unit 44 to display one or more television programs; and

a central processing unit (CPU) 58 for controlling the remote control signal receiving unit 51, the tuner 52, the demodulating unit 53, the demultiplexer 54 and the section

10 decoder 55, controlling the audio-video signal decoder 57 to display a particular television program provided by the particular broadcast service enterpriser on the displaying unit 44, producing a common electronic program guide common to all broadcast service enterprisers from the pieces of general 15 electronic program information of the broadcast service enterprisers stored in the storing unit 56, producing an individual electronic program guide of the particular broadcast service enterpriser from the individual electronic program information of the particular broadcast service 20 enterpriser stored in the storing unit 56, controlling the audio-video signal decoder 57 to display an individual electronic program guide of the particular broadcast service enterpriser or the common electronic program guide on the displaying unit 44 according to the remote control signal 25 received in the receiving unit 51.

Therefore, the CPU 58 functions as a common electronic program guide producing means and an individual electronic program guide producing means.

In the above configuration, an operation of the electronic 5 program guide producing apparatus 42 is described.

When a viewer selects a particular broadcasting station by operating a button of the remote control unit 43, a particular digital broadcast signal of the particular broadcasting station received in the antenna 41 is selected in the tuner 52 10 according to a remote control signal of the unit 43.

Thereafter, the particular digital broadcast signal is demodulated in the demodulating unit 53 and is demultiplexed in the demultiplexer 54, so that video and audio signals, individual electronic program information of the particular 15 broadcast service enterpriser and pieces of general electronic program information of broadcast service enterpriser other than the particular broadcast service enterpriser (a group of program specific information (PSI) tables or a group of service information (SI) tables) are obtained from the 20 particular digital broadcast signal. The video and audio signals are decoded in the audio-video signal decoder 57, and a plurality of television programs provided by the particular broadcast service enterpriser are displayed one after another on the displaying unit 44.

25 The tables PSI or SI of the electronic program information

(the pieces of general electronic program information and the individual electronic program information of the particular broadcast service enterpriser) is decoded in the section decoder 55 and is stored in the electronic program information 5 storing unit 56. In this case, each table of the electronic program information has a packet identification number and/or a table identification number, and a packet identification number of one table is written in another table. Therefore, a plurality of packets corresponding to the electronic program 10 information can be collected from a particular transport stream of the particular digital broadcast signal, and types of the tables can be specified according to the table identification numbers. Also, the tables (PSI or SI) of the electronic program information are repeatedly received in the 15 apparatus 42, and a version number attached to each table is checked by the CPU 58. Therefore, updated tables such as a network information table (NIT), a service description table (SDT) and an event information table (EIT) can be always stored in the storing unit 56.

20 For example, in case of the digital video broadcasting (DVB) of the European digital broadcast standards, the common electronic program information such as a bouquet association table (BAT) and a network information table (NIT) is transmitted from the electronic program information preparing 25 and transmitting apparatus 30 and is received in the

electronic program guide producing apparatus 42. As shown in Fig. 10, one or more transport streams corresponding to one network are listed in each NIT, and one or more channel services of the broadcasting station of one broadcast service 5 enterpriser (or one bouquet) are listed in each BAT. In case of the MPEG2, as shown in Fig. 11, the common electronic program information such as a program association table (PAT) and a program map table (PMT) is transmitted from the electronic program information preparing and transmitting 10 apparatus 30 and is received in the electronic program guide producing apparatus 42.

Also, in case of the DVB, the non-common electronic program information such as an event information table (EIT) and a service description table (SDT) is transmitted from the 15 electronic program information preparing and transmitting apparatus 30 and is received in the electronic program guide producing apparatus 42. The word "event" prescribed according to the digital video broadcasting (DVB) of the European digital broadcast standards denotes a television program. As 20 shown in Fig. 12, information of one or more television programs of one channel service carried in one transport stream is described in each EIT, and one or more channel services of television programs carried in one transport stream are described in each SDT.

25 Therefore, in case of the DVB, as shown in Fig. 13, three

channel services of identification numbers ID1, ID2 and ID3 of a broadcasting station Sb1, the BAT and NIT of the common electronic program information and the SDT and EIT of the non-common electronic program information corresponding to the 5 broadcasting station Sb1 are carried in a transport stream TS20, three channel services of identification numbers ID4, ID5 and ID6 of a broadcasting station Sb2, the BAT and NIT of the common electronic program information and the SDT and EIT of the non-common electronic program information corresponding 10 to the broadcasting station Sb2 are carried in a transport stream TS30, and three channel services of identification numbers ID7, ID8 and ID9 of the broadcasting station Sb2, the BAT and NIT of the common electronic program information and the SDT and EIT of the non-common electronic program 15 information corresponding to the broadcasting station Sb2 are carried in a transport stream TS40.

Thereafter, an individual electronic program guide of one or more television programs is produced in the CPU 58 by using the tables of the electronic program information stored in the 20 storing unit 56. In detail, the BAT is extracted from the tables for each bouquet, a particular bouquet corresponding to a particular television program currently viewed by the viewer is specified, all particular channel services corresponding to the particular bouquet are specified by using a particular BAT 25 of the particular bouquet, particular EIT and SDT

corresponding to the particular channel services are extracted from the tables, particular electronic program information corresponding to the particular channel services are extracted from the electronic program information, and an individual 5 electronic program guide is produced according to the particular EIT and SDT and the particular electronic program information. Thereafter, the individual electronic program guide of a particular broadcast service enterpriser corresponding to the particular television program currently 10 watched by the viewer is displayed on the displaying unit 44.

An example of the individual electronic program guide is shown in Fig. 14. The channel service identification numbers (ID) ST4 to ST9 are obtained from the particular SDT, and names of particular television programs, broadcast start times 15 of the particular television programs and broadcasting durations of the particular television programs are obtained from the particular EIT.

Accordingly, when a viewer watches a particular television program provided by a particular broadcast service 20 enterpriser, an individual electronic program guide of the particular broadcast service enterpriser can be displayed.

Also, because an individual electronic program guide of a particular broadcast service enterpriser corresponding to a particular television program currently watched by the viewer 25 is displayed, there is no probability that an individual

electronic program guide of a broadcast service enterpriser not corresponding to a particular television program currently watched by the viewer is erroneously displayed, so that a trouble between broadcast service enterprisers can be avoided.

5       In this embodiment, electronic program information is transmitted from an electronic program information preparing and transmitting apparatus to the electronic program guide producing apparatus 42 according to a satellite communication or a terrestrial television broadcasting service. However, it  
10      is applicable that electronic program information be transmitted through another network system such as a telephone circuit. Also, it is applicable that electronic program information recorded in a recording medium such as a digital versatile disc (DVD) or a floppy disc (FD).

15      (Fifth Embodiment)

Each broadcasting station (or each broadcast service enterpriser) provides a plurality of television programs of a plurality of channel services. That is, there are a plurality of television channels corresponding to the channel services  
20      for each broadcasting station.

In this embodiment, when a viewer selects a specific bouquet (or a specific broadcasting station), a specific channel service is selected from a plurality of channel services of the specific broadcasting station, so that a  
25      specific television channel corresponding to the specific

channel service is automatically selected.

Fig. 15 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to a fifth embodiment of 5 the present invention.

As shown in Fig. 15, an electronic program guide producing apparatus 59 comprises:

the remote control signal receiving unit 51, the tuner 52; the demodulating unit 53; the demultiplexer 54; the section 10 decoder 55; the electronic program information storing unit 56; the audio-video signal decoder 57; and a central processing unit (CPU) 60 for controlling the remote control signal receiving unit 51, the demodulating unit 53, the demultiplexer 54 and the section decoder 55, 15 controlling the audio-video signal decoder 57 to display a particular television program provided by the particular broadcast service enterpriser on the displaying unit 44, producing a common electronic program guide common to all broadcast service enterprisers from the pieces of general 20 electronic program information of the broadcast service enterprisers stored in the storing unit 56, producing an individual electronic program guide of the particular broadcast service enterpriser from the individual electronic program information of the particular broadcast service 25 enterpriser stored in the storing unit 56, controlling the

audio-video signal decoder 57 to display an individual electronic program guide of the particular broadcast service enterpriser or the common electronic program guide on the displaying unit 44 according to the remote control signal 5 received in the receiving unit 51, and controlling the tuner 52 to automatically select a specific television channel of a specific broadcast service enterpriser in cases where a remote control signal indicating the specific broadcast service enterpriser is received in the remote control signal receiving 10 unit 51.

In the above configuration, an operation of the electronic program guide producing apparatus 59 is described with reference to Fig. 16 and Fig. 17.

A bouquet association table (BAT), in which a default 15 selection flag is attached to each channel service, is transmitted from the electronic program information preparing and transmitting apparatus 10, 20 or 30 to the apparatus 59 for each broadcast service enterpriser, and the BATs are stored in the storing unit 56 in the same manner as in the 20 fourth embodiment. For example, bouquet association tables of the broadcasting stations Sb1 and Sb2 are shown in Fig. 16. As shown in Fig. 16, because a default selection flag attached to the channel service ST1 is set to "on" in the BAT of the broadcasting station Sb1, the BAT indicates a preferential 25 selection of the channel service ST1.

Thereafter, when a viewer selects a particular broadcasting station by using the remote control unit 43, default selection flags of a particular bouquet association table (BAT) corresponding to the particular broadcasting station are

5 checked by the CPU 60, and a particular television channel corresponding to a particular channel service, to which a default selection flag set to "on" is attached, is automatically selected. An example of a default selection is shown in Fig. 17.

10 As shown in Fig. 17, in cases where a viewer desires a broadcasting station "Japan TV" when the viewer watches a television program of a broadcasting station "Fujisan", the viewer pushes a button of the broadcasting station "Japan TV" arranged in the remote control unit 43. Thereafter, the CPU 60

15 checks the BAT of the broadcasting station "Japan TV", a channel service ST1 is specified because a default flag attached to the channel service ST1 is set to "on", and a television channel corresponding to the channel service ST1 is automatically selected.

20 Thereafter, television programs and electronic program information carried in a transport stream corresponding to the particular channel service is selected in the tuning unit 52. Therefore, a television program of the particular television channel can be automatically displayed on the displaying unit

25 44.

Accordingly, because each broadcast service enterpriser can specify a particular television channel selected from a plurality of television channels of the broadcast service enterpriser, the broadcast service enterpriser can make the 5 viewer automatically select the most important television channel determined by the broadcast service enterpriser.

(Sixth Embodiment)

In this embodiment, a program attribute indicating an attribute of one television program is attached to an 10 identification number of each television program in a table of the electronic program information.

Fig. 18 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to a sixth embodiment of 15 the present invention.

As shown in Fig. 18, an electronic program guide producing apparatus 61 comprises:

the remote control signal receiving unit 51, the tuner 52; the demodulating unit 53; the demultiplexer 54; the section 20 decoder 55; the audio-video signal decoder 57; an electronic program information storing unit 62 for storing the PSI or SI of the electronic program information decoded in the section decoder 55 and storing a viewer attribute set by a viewer; and 25 a central processing unit (CPU) 63 for controlling the remote

control signal receiving unit 51, the tuner 52, the demodulating unit 53, the demultiplexer 54 and the section decoder 55, comparing the viewer attribute stored in the storing unit 62 with a program attribute which is attached to 5 an identification number of each television program corresponding to the particular broadcast service enterpriser in a table of the electronic program information stored in the storing unit 62, selecting a particular television program corresponding to a particular program attribute matching with 10 the viewer attribute, controlling the audio-video signal decoder 57 to display the particular television program on the displaying unit 44, and controlling the electronic program information storing unit 62 to display an individual electronic program guide of the particular broadcast service 15 enterpriser on the displaying unit 44 by extracting particular tables corresponding to the particular broadcast service enterpriser from the tables stored in the storing unit 62 according to the remote control signal received in the receiving unit 51.

20 In the above configuration, a viewer attribute set by a viewer is stored in advance in the electronic program information storing unit 62. The viewer attribute indicates a taste of a viewer, features of the viewer and the like. When the viewer selects a particular broadcast service enterpriser 25 by using the remote control unit 43, a particular table, in

which identification numbers of a plurality of television programs provided by the particular broadcast service enterpriser are listed, is stored in the storing unit 62 in the same manner as in the fourth embodiment. In this case, a 5 program attribute indicating an attribute of one television program is attached to the identification number of each television program in the particular table.

Thereafter, a particular television program corresponding to a particular program attribute matching with the viewer 10 attribute is selected from the program attributes in the CPU 63, and the particular television program of a particular television channel is displayed on the displaying unit 44.

Accordingly, a particular program attribute matching with the viewer attribute can be selected, and a particular 15 television program corresponding to the particular program attribute can be automatically displayed. Therefore, the viewer can automatically select the particular television program suitable for a particular attribute of the viewer.

(Seventh Embodiment)

20 In this embodiment, a program service genre indicating a genre of one television program is attached to an identification number of each television program in a table of the electronic program information.

Fig. 19 is a block diagram of an electronic program 25 information receiving terminal including an electronic program

guide producing apparatus according to a seventh embodiment of the present invention.

As shown in Fig. 19, an electronic program guide producing apparatus 71 comprises:

- 5 the remote control signal receiving unit 51, the tuner 52; the demodulating unit 53; the demultiplexer 54; the section decoder 55; the audio-video signal decoder 57;
- 10 an electronic program information storing unit 72 for storing the PSI or SI of the electronic program information decoded in the section decoder 55 and storing a viewer service genre set by a viewer; and
- 15 a central processing unit (CPU) 73 for controlling the remote control signal receiving unit 51, the tuner 52, the demodulating unit 53, the demultiplexer 54 and the section decoder 55, comparing the viewer service genre stored in the storing unit 72 with a program service genre which is attached to an identification number of each television program corresponding to the particular broadcast service enterpriser in a table of the electronic program information stored in the
- 20 storing unit 72, selecting a particular television program corresponding to a particular program service genre agreeing with the viewer service genre, controlling the audio-video signal decoder 57 to display the particular television program on the displaying unit 44, and controlling the electronic program information storing unit 72 to display an individual
- 25

electronic program guide of the particular broadcast service enterpriser on the displaying unit 44 by extracting particular tables corresponding to the particular broadcast service enterpriser from the tables stored in the storing unit 72  
5 according to the remote control signal received in the receiving unit 51.

In the above configuration, a viewer service genre, which is set by a viewer or is judged according to program viewing records of the viewer, is stored in advance in the electronic program information storing unit 72. The viewer service genre indicates a service genre desired by a viewer. For example, a movie genre, a sports genre, a music genre or the like is set 10 as the viewer service genre.

When the viewer selects a particular broadcast service enterpriser by using the remote control unit 43, a particular table, in which identification numbers of a plurality of television programs provided by the particular broadcast service enterpriser are listed, is stored in the storing unit 72 in the same manner as in the fourth embodiment. In this 15 case, a program service genre indicating a service genre of one television program is attached to the identification number of each television program in the particular table.  
20

Thereafter, a particular television program corresponding to a particular program service genre agreeing with the viewer 25 service genre is selected from the program service genres in

the CPU 73, and the particular television program of a particular television channel is displayed on the displaying unit 44.

Accordingly, because a particular program service genre 5 agreeing with the viewer service genre can be selected and because a particular television program corresponding to the particular program service genre is displayed, the viewer can automatically select the particular television program belonging to a service genre suitable for the taste of the 10 viewer.

(Eighth Embodiment)

In cases where a high definition television (HDTV) program is transmitted from a broadcasting station center system to viewer's terminals, because a transmission band of the HDTV 15 program is so wide as to extend over three transmission bands of three standard television programs, the HDTV program corresponding to three television channels of one transport stream is transmitted after the three standard television programs corresponding to the three television channels are 20 transmitted. In this case, an event information table (EIT) of one channel service is prepared as a table of electronic program information in the broadcasting station center system for each of the three television channels. Assuming that 25 information of the HDTV program is described in each of the three event information tables (EITs) corresponding to the

three television channels, the transmission band for the electronic program information cannot be efficiently used.

To prevent this problem in this embodiment, information of the HDTV program is described in one event information table 5 (EIT), and event link information is written in the other two event information tables (EITs).

Fig. 20 shows three event information tables (EITs) prepared in the electronic program information preparing and transmitting apparatus 10, 20 or 30 according to an eighth 10 embodiment of the present invention.

As shown in Fig. 20, in cases where three standard television programs identified by identification numbers TP35, TP51 and TP61 are transmitted from a broadcasting station center system before an HDTV program corresponding to three 15 television channels of the three standard television programs is transmitted from the broadcasting station center system, three particular event information tables (EITs) of channel services ST6, ST7 and ST8 are transmitted from the apparatus 10, 20 or 30. The HDTV program is identified by an 20 identification number TP40 in the event information table (EIT) of the channel service ST6, the HDTV program is identified by an identification number TP52 in the event information table (EIT) of the channel service ST7, and the HDTV program is identified by an identification number TP62 in 25 the event information table (EIT) of the channel service ST8.

In each particular event information table, a column of event link information is arranged. In the particular event information table (EIT) of the channel service ST6, information (for example, a title of the HDTV program, a 5 broadcasting start time of the HDTV program and a duration of broadcasting of the HDTV program) of the HDTV program is described in columns of the television program identification number TP40. Therefore, the television program TP40 is called an actual television program actually broadcasted.

10 In each of the particular event information tables (EITs) of the channel service ST7 and ST8, information of the HDTV program is not described, but event link information "refer to event TP40 of channel service ST6 of transport stream TS30" is described in the column of event link information. Therefore, 15 the television programs TP52 and TP62 are respectively called a virtual television program not actually broadcasted.

Fig. 21 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to the eighth embodiment 20 of the present invention.

As shown in Fig. 21, an electronic program guide producing apparatus 81 comprises:

the remote control signal receiving unit 51, the tuner 52; the demodulating unit 53; the demultiplexer 54; the section 25 decoder 55; the electronic program information storing unit

56; the audio-video signal decoder 57; and  
a central processing unit (CPU) 82 for controlling the remote  
control signal receiving unit 51, the tuner 52, the  
demodulating unit 53, the demultiplexer 54 and the section  
5 decoder 55, controlling the audio-video signal decoder 57 to  
display a particular television program of the particular  
broadcast service enterpriser on the displaying unit 44,  
controlling the electronic program information storing unit 56  
to store electronic program information corresponding to each  
10 channel service, displaying an event information table on the  
displaying unit 44 in cases where event link information is  
attached to the event information table, and producing an  
individual electronic program guide of the particular  
broadcast service enterpriser while removing all virtual  
15 television programs from a broadcasting schedule of television  
programs of the particular broadcast service enterpriser.

In the above configuration, in cases where a particular  
event information table (EIT), in which event link information  
is described, is detected by the CPU 82 from the electronic  
20 program information stored in the storing unit 56, because a  
particular television program corresponding to the event link  
information is a virtual television program not actually  
broadcasted, the particular television program is removed from  
a broadcasting schedule of television programs, and an  
25 individual electronic program guide of the particular

broadcast service enterpriser is produced while using the broadcasting schedule of television programs.

Also, the particular event information table (EIT) is displayed on the displaying unit 44 to inform a viewer that a 5 television program corresponding to the event link information is a virtual television program not actually broadcasted.

Also, in cases where the viewer specifies the virtual television program, of which the identification number is displayed, by using the remote control unit 43, an HDTV 10 program corresponding to the virtual television program is displayed on the displaying unit 44.

Accordingly, even though an HDTV program is broadcasted, because each virtual television program not actually broadcasted can be specified by event link information, 15 information of the virtual television program can be automatically removed from an individual electronic program guide. Therefore, the viewer can watch the individual electronic program guide in which information of the virtual television program is removed, and the data transmission band 20 for the electronic program information can be efficiently used.

Also, in the same manner, information of the virtual television program can be automatically removed from a common electronic program guide.

25 In this embodiment, each virtual television program not

actually broadcasted is specified according to the event link information attached to the event information table (EIT). However, it is applicable that a table of television programs corresponding to the same HDTV program be prepared. In this 5 case, each virtual television program can be specified according to the table.

(Ninth Embodiment)

In this embodiment, in cases where an HDTV program extending over a plurality of television channels adjacent to 10 each other is broadcasted in each viewer's terminal, a plurality of areas of the television channels are combined into a linked area in an electronic program guide (an individual electronic program guide or a common electronic program guide), and a guide of the HDTV program is described 15 in the linked area of the electronic program guide.

Fig. 22 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to a ninth embodiment of the present invention.

20 As shown in Fig. 22, an electronic program guide producing apparatus 91 comprises:

the remote control signal receiving unit 51, the tuner 52; the demodulating unit 53; the demultiplexer 54; the section decoder 55; the electronic program information storing unit 25 56; the audio-video signal decoder 57; and

025337 00000000000000000000000000000000  
a central processing unit (CPU) 92 for controlling the remote control signal receiving unit 51, the tuner 52, the demodulating unit 53, the demultiplexer 54 and the section decoder 55, controlling the audio-video signal decoder 57 to 5 display a particular television program of the particular broadcast service enterpriser on the displaying unit 44, controlling the electronic program information storing unit 56 to store electronic program information corresponding to each channel service, producing an electronic program guide, in 10 which information of an HDTV program extending over a plurality of television channels adjacent to each other is described in a linked area extending over guide areas of the television channels, in cases where event link information is described in one or more event information tables, and 15 displaying the electronic program guide on the displaying unit 44.

In the above configuration, in cases where one or more event information tables EIT (refer to Fig. 20), in which event link information is described, are detected in the CPU 20 92 because an HDTV program extending over three television channels adjacent to each other is broadcasted, an electronic program guide, in which a guide of the HDTV program is described in a linked area extending over guide areas of the television channels, is produced. For example, as shown in 25 Fig. 23, in cases where an HDTV program extending over three

television channels CH6, CH7 and CH8 is broadcasted, a guide of the HDTV program is described in a linked area extending over guide areas of the television channels CH6, CH7 and CH8 in the electronic program guide. Thereafter, the electronic 5 program guide is displayed.

Accordingly, even though a data transmission band of an HDTV program extends over those of a plurality of standard television programs is broadcasted, because a guide of the HDTV program is described in a linked area extending over 10 guide areas of a plurality of television channels of the standard television programs, the viewer can easily watch the electronic program guide.

In this embodiment, the event link information is described in one or more event information tables (EITs) to recognize 15 that one or more virtual television programs are the same as the HDTV program. However, it is applicable that a table of television programs corresponding to the same HDTV program be prepared. In this case, each virtual television program can be specified according to the table.

20 (Tenth Embodiment)

In this embodiment, in cases where an HDTV program extending over a plurality of television channels is broadcasted in each viewer's terminal, a guide of the HDTV program is described in the guide area of each television 25 channel even though event link information is described in

each event information table (EIT) of channel services corresponding to the television channels, and the HDTV program guide described in each guide area is highlighted when a viewer selects one of the HDTV program guides displayed on the 5 displaying unit 44.

Fig. 24 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to a tenth embodiment of the present invention.

10 As shown in Fig. 24, an electronic program guide producing apparatus 101 comprises:

the remote control signal receiving unit 51, the tuner 52; the demodulating unit 53; the demultiplexer 54; the section decoder 55; the electronic program information storing unit 15 56; the audio-video signal decoder 57; and a central processing unit (CPU) 102 for controlling the remote control signal receiving unit 51, the tuner 52, the demodulating unit 53, the demultiplexer 54 and the section decoder 55, controlling the audio-video signal decoder 57 to 20 display a particular television program of the particular broadcast service enterpriser on the displaying unit 44, controlling the electronic program information storing unit 56 to store electronic program information corresponding to each channel service, producing an electronic program guide, in 25 which information of an HDTV program extending over a

plurality of television channels is described in a guide area of each television channel, in cases where event link information is described in one or more event information tables, displaying the electronic program guide on the 5 displaying unit 44, and highlighting the HDTV program guide described in each guide area when a viewer selects one of the HDTV program guides displayed on the displaying unit 44.

In the above configuration, in cases where one or more event information tables EIT (refer to Fig. 20), in which 10 event link information is described, are detected in the CPU 102 because an HDTV program extending over a plurality of television channels is broadcasted, an electronic program guide, in which guide information of the HDTV program is described in a guide area of each television channel, is 15 produced and displayed. Thereafter, when a viewer selects one of the HDTV program guides displayed on the displaying unit 44 by using the remote control unit 43, all guides of the HDTV program described in the guide areas of the television channels are highlighted.

20 For example, as shown in Fig. 25, in cases where an HDTV program extending over three television channels CH1, CH2 and CH4 is broadcasted, information of the HDTV program is described in each guide area of the television channels CH1, CH2 and CH4 in the electronic program guide. Thereafter, the 25 electronic program guide is displayed. When a viewer selects

one HDTV program guide of one television channel CH1, CH2 or CH4, all HDTV program guides of the television channels CH1, CH2 and CH4 are highlighted.

Accordingly, because all HDTV program guides are  
5 highlighted by selecting one HDTV program guide, the viewer  
can easily recognize all television channels corresponding to  
the HDTV program. In particular, even though the television  
channels corresponding to the HDTV program are separately  
positioned in the electronic program guide, the viewer can  
10 quickly recognize all television channels corresponding to the  
HDTV program. Therefore, the viewer can easily watch the  
electronic program guide.

In this embodiment, the event link information is described  
in one or more event information tables (EITs) to recognize  
15 that one or more virtual television programs are the same as  
the HDTV program. However, it is applicable that a table of  
television programs corresponding to the same HDTV program be  
prepared. In this case, each virtual television program can be  
specified according to the table.

20 (Eleventh Embodiment)

In this embodiment, a bandwidth in data transmission of one  
television program from a broadcasting station center system  
to a receiving terminal apparatus of each viewer is described  
as bandwidth information for each television program in an  
25 event information table EIT of electronic program information.

When the event information table EIT is received in each receiving terminal apparatus, information of each television program is displayed on condition that a display width of each television program information is proportional to the 5 bandwidth of the television program.

The transmission bandwidth is expressed by a data transfer rate (bit per second), so that the bandwidth information of each television program indicates a display quality of the television program. An event information table EIT of the 10 channel service ST4 and an event information table EIT of the channel service ST5 are shown in Fig. 26 as an example.

Fig. 27 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to an eleventh embodiment 15 of the present invention.

As shown in Fig. 27, an electronic program guide producing apparatus 111 comprises:

the remote control signal receiving unit 51, the tuner 52; the demodulating unit 53; the demultiplexer 54; the section 20 decoder 55; the electronic program information storing unit 56; the audio-video signal decoder 57; and a central processing unit (CPU) 112 for controlling the remote control signal receiving unit 51, the tuner 52, the demodulating unit 53, the demultiplexer 54 and the section 25 decoder 55, controlling the audio-video signal decoder 57 to

display a particular television program of the particular broadcast service enterpriser on the displaying unit 44, controlling the electronic program information storing unit 56 to store electronic program information corresponding to each 5 channel service, producing an electronic program guide, in which information of each television program is arranged on condition that a display width of each television program information is proportional to a bandwidth of the television program, in cases where bandwidth information is described for 10 each television program of each event information table, and displaying the electronic program guide on the displaying unit 44.

In the above configuration, in cases where an event information table EIT, in which bandwidth information 15 indicating a transmission bandwidth is described for each television program, is received and stored in the storing unit 56 for each channel service, an electronic program guide, in which information of each television program having a display width proportional to the transmission bandwidth of the 20 television program is displayed, is produced and is displayed.

For example, because bandwidth information indicating a wide bandwidth of 18 Mbps is described for each of television programs "morning news" and "morning world" in the event information tables EIT shown in Fig. 26, as shown in Fig. 28, 25 information of each of television programs "morning news" and

"morning world" in an electronic program guide has a wide display width.

Accordingly, when a viewer watches an electronic program guide, because a display width of information of each 5 television program is proportional to the bandwidth of the television program, the viewer can visibly recognize a display quality of the television program, so that the viewer can utilize the electronic program guide for the selection of one or more television programs.

10 In this embodiment, bandwidth information is described for each television program in the event information tables EIT of the electronic program information. However, it is applicable that bandwidth information be described for each channel service corresponding to one television channel in the 15 service description table SDT of the electronic program information. In this case, as shown in Fig. 29, an electronic program guide, in which a display width for information of a plurality of television programs corresponding to one television channel is set for each television channel, is displayed, so that the viewer can visibly recognize a display 20 quality of television programs for each television channel. Also, it is applicable that bandwidth information be included in the audio and video signals of each television program and the bandwidth information be extracted from the audio and 25 video signals in the A/V decoder 57.

Also, in this embodiment, a display quality of each television program is indicated by a display width of information of the television program. However, it is applicable that a colored mark or an icon indicating a display 5 quality of each television program be displayed according to the bandwidth information of the television program.

Also, in this embodiment, bandwidth information indicating a display quality of each television program is transmitted from the broadcasting station center system to each electronic 10 program guide producing apparatus 111. However, it is applicable that a channel service type of each television channel be described in the service description tables SDT and a display width indicating a display quality of each television program be determined according to a correspondence 15 table indicating the correspondence between each channel service type and one display width (refer to Fig. 30). The correspondence table indicating the correspondence between each channel service type and one display width is stored in advance in the storing unit 56 or is transmitted with the 20 electronic program information. Therefore, when a channel service type of one television channel is received in the apparatus 111, a display width corresponding to the channel service type is determined in the CPU 113, and information of television programs corresponding to the television channel is 25 displayed at the display width.

(Twelfth Embodiment)

In this embodiment, a three-dimensional electronic program guide (or a three-dimensional common electronic program guide) composed of a broadcast service enterpriser, a broadcasting schedule and a television channel is displayed.

Fig. 31 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to a twelfth embodiment of the present invention.

As shown in Fig. 31, an electronic program guide producing apparatus 121 comprises:

the remote control signal receiving unit 51, the tuner 52; the demodulating unit 53; the demultiplexer 54; the section decoder 55; the electronic program information storing unit 56; the audio-video signal decoder 57; and a central processing unit (CPU) 122 for controlling the remote control signal receiving unit 51, the tuner 52, the demodulating unit 53, the demultiplexer 54 and the section decoder 55, controlling the audio-video signal decoder 57 to display a particular television program of the particular broadcast service enterpriser on the displaying unit 44, controlling the electronic program information storing unit 56 to store electronic program information corresponding to each channel service, producing a three-dimensional electronic program guide, in which information of each television program

is arranged in a three-dimensional area formed by a television channel axis, a broadcasting time axis and a broadcast service enterpriser axis on condition that a display width of each television program information in the television channel axis 5 is proportional to a bandwidth of the television program, in cases where bandwidth information is described for each television program of each event information table, and displaying an oblique projective figure of the three-dimensional electronic program guide on the displaying unit 44.

10        In the above configuration, in cases where an event information table EIT, in which bandwidth information indicating a transmission bandwidth is described for each television program, is received and stored in the storing unit 56 for each channel service, a three-dimensional electronic 15 program guide, in which information of each television program is arranged in a three-dimensional area formed by a television channel axis, a broadcasting time axis and a broadcast service enterpriser axis, is produced on condition that a display width of each television program information in the television 20 channel axis is proportional to a bandwidth of the television program. Thereafter, an oblique projective figure of the three-dimensional electronic program guide is displayed on the displaying unit 44.

25        An example of the three-dimensional electronic program guide is shown in Fig. 32. As shown in Fig. 32, a television

channel of each television program is expressed in an X direction, a broadcast service enterpriser of each television program is expressed in a Y direction, a broadcasting time of each television program is expressed in a Z direction, and a 5 display width of each television program in the X direction is proportional to the bandwidth of the television program. Also, a promotion figure of each television program placed on the most right side is displayed on a Y-Z plane. The promotion figure is included in the electronic program information 10 transmitted from the broadcasting station center system and is displayed as an advertisement of broadcast service enterpriser.

Accordingly, the viewer can easily recognize a broadcast service enterpriser of each television program by watching the 15 three-dimensional electronic program guide. Also, the viewer can watch a promotion figure of each television program.

In this embodiment, the television channel of each television program is expressed in the X direction. However, the arrangement of the television channel, the broadcast 20 service enterpriser and the broadcasting time is not limited to the three-dimensional electronic program guide shown in Fig. 32. For example, it is applicable that the broadcast service enterpriser of each television program be expressed in the X direction while expressing a display width proportional 25 to the bandwidth of each television program in the X

direction.

Also, it is applicable that a television channel of television programs placed on the most right side be changed to another television channel.

5 (Thirteenth Embodiment)

When the viewer desires to determine a particular television program, the viewer selects a plurality of television channels one after another to watch a plurality of television programs broadcasted at the same time one after 10 another while watching the electronic program guide of the television programs. In cases where an HDTV program extending over a plurality of television channels is broadcasted in each viewer's terminal, information of the HDTV program is described in a plurality of guide areas of a plurality of 15 television channels in the ninth and tenth embodiments.

Therefore, a television channel corresponding to the HDTV program is selected many times when the viewer desires to determine a particular television program.

For example, in cases where the electronic program guide 20 shown in Fig. 33 is displayed on the displaying unit 44, the viewer selects a plurality of television channels CH1 to CH5 one after another to watch a plurality of television programs TP100, TP105 and TP104 broadcasted in the same 4 o'clock one after another. In this case, when the viewer operates the 25 remote control unit 43 to move a cursor displayed on the

displaying unit 44 from the channel CH1 of the left side to the channel CH5 of the right side, the channel CH1 (television program TP100), the channel CH2 (HDTV program TP105), the channel CH3 (HDTV program TP105), the channel CH4 (HDTV program TP105) and the channel CH5 (television program TP104) are selected in that order. Therefore, the HDTV program TP105 is displayed three times on the displaying unit 44.

In this embodiment, as shown in Fig. 34, the selection of the television channels CH3 and CH4 is omitted, and the channel CH1 (television program TP100), the channel CH2 (HDTV program TP105) and the channel CH5 (television program TP104) are selected in that order, and the television program TP100, the television program TP105 and the television program TP104 are displayed on the displaying unit 44 in that order.

Fig. 35 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to a thirteenth embodiment of the present invention.

As shown in Fig. 35, an electronic program guide producing apparatus 131 comprises:

the remote control signal receiving unit 51, the tuner 52; the demodulating unit 53; the demultiplexer 54; the section decoder 55; the electronic program information storing unit 56; the audio-video signal decoder 57; and a central processing unit (CPU) 132 for controlling the

remote control signal receiving unit 51, the tuner 52, the demodulating unit 53, the demultiplexer 54 and the section decoder 55, controlling the audio-video signal decoder 57 to display a particular television program of the particular broadcast service enterpriser on the displaying unit 44, controlling the electronic program information storing unit 56 to store electronic program information corresponding to each channel service, producing an electronic program guide, in which information of an HDTV program extending over a plurality of television channels adjacent to each other is described in a linked area extending over guide areas of the television channels, in cases where event link information is described in one or more event information tables, displaying the electronic program guide on the displaying unit 44, selecting a plurality of television channels, which are specified by a cursor moved on information of a plurality of television programs in the electronic program guide, one after another while selecting only one television channel from a plurality of television channels corresponding to an HDTV program, and displaying the television programs of the selected television channels one after another.

In the above configuration, as shown in Fig. 33, even though information of an HDTV program extending over a plurality of television channels is described in the guide areas of the television channels, a television channel

corresponding to the HDTV program is not selected in duplicate. Therefore, as shown in Fig. 34, the television channel CH2 is only selected from the television channels CH2, CH3 and CH4 corresponding to the HDTV program TP105.

5 Accordingly, the viewer does not watch the HDTV program in duplicate, so that the viewer can efficiently determine a television channel of a particular television program.

In this embodiment, an identification number such as TP100 is described as service identifying information of each 10 television program in the electronic program table. However, it is applicable that a title of each television program or a logotype of each television program be described as service identifying information.

Also, information of the HDTV program is described in the 15 linked area according to the ninth embodiment. However, it is applicable that information of the HDTV program extending over a plurality of television channels be described in a guide area of each television channel according to the tenth embodiment.

20 (Fourteenth Embodiment)

In the thirteenth embodiment, as shown in Fig. 34, the numbers of the television channels are not displayed in serial order. Therefore, the viewer cannot easily realize the selection of the television channels.

25 In the fourteenth embodiment, in cases where an HDTV

program extending over a plurality of television channels is displayed on the displaying unit 44, as shown in Fig. 36, the numbers of all television channels corresponding to the HDTV program are displayed with the HDTV program.

5 Fig. 37 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to a fourteenth embodiment of the present invention.

As shown in Fig. 37, an electronic program guide producing 10 apparatus 141 comprises:

the remote control signal receiving unit 51, the tuner 52; the demodulating unit 53; the demultiplexer 54; the section decoder 55; the electronic program information storing unit 56; the audio-video signal decoder 57; and

15 a central processing unit (CPU) 142 for controlling the remote control signal receiving unit 51, the tuner 52, the demodulating unit 53, the demultiplexer 54 and the section decoder 55, controlling the audio-video signal decoder 57 to display a particular television program of the particular broadcast service enterpriser on the displaying unit 44, controlling the electronic program information storing unit 56 to store electronic program information corresponding to each channel service, producing an electronic program guide, in which information of an HDTV program extending over a 25 plurality of television channels adjacent to each other is

described in a linked area extending over guide areas of the television channels, in cases where event link information is described in one or more event information tables, displaying the electronic program guide on the displaying unit 44,

5 selecting a plurality of television channels, which are specified by a cursor moved on information of a plurality of television programs in the electronic program guide, one after another while selecting only a particular television channel from a plurality of television channels corresponding to an

10 HDTV program, and displaying the television programs of the selected television channels one after another with a channel number of each selected television channel on condition that a plurality of channel numbers of all television channels corresponding to the HDTV program are displayed with the HDTV

15 program when the particular television channel of the HDTV program is selected.

In the above configuration, as shown in Fig. 36, when the particular television channel CH2 of the HDTV program is selected, channel numbers CH2, CH3 and CH4 of all television

20 channels corresponding to the HDTV program are displayed with the HDTV program. Therefore, all channel numbers CH1 to CH5 are displayed in serial order.

Accordingly, the viewer can easily realize the selection of the television channels.

25 In this embodiment, an identification number such as TP100

is described as service identifying information of each television program in the electronic program table. However, it is applicable that a title of each television program or a logotype of each television program be described as service 5 identifying information.

Also, information of the HDTV program is described in the linked area according to the ninth embodiment. However, it is applicable that information of the HDTV program extending over a plurality of television channels be described in a guide 10 area of each television channel according to the tenth embodiment.

(Fifteenth Embodiment)

As shown in Fig. 38, a channel service ST101 of television programs belonging to a service type "SDTV", a channel service 15 ST103 of television programs belonging to a service type "music" and a group of channel services ST900, ST901, ST902 and ST903 of television programs belonging to the service type "music" are transmitted from the broadcasting station center system to each electronic program information receiving 20 apparatus. The group of channel services ST900, ST901, ST902 and ST903 are subordinate to the channel service ST103.

As shown in Fig. 39, the television programs of the channel services ST101 and ST103 are carried in a transport stream TS3, and the television programs of the channel services 25 ST900, ST901, ST902 and ST903 are carried in a transport

stream TS5.

In this embodiment, because the channel services ST900, ST901, ST902 and ST903 are subordinate to the channel service ST103, as shown in Fig. 40, pieces of information of the television programs of the channel services ST101 and ST103 are described in a service description table SDT of the transport stream TS3, and each of the channel services ST101 and ST103 is called a main channel service. Also, as shown in Fig. 41, pieces of information of the television programs of the channel services ST101 and ST103 and pieces of information of the television programs of the channel services ST900, 5 ST901, ST902 and ST903 are described in a service description table SDT of the transport streams TS3 and TS5. Each of the channel services ST900, ST901, ST902 and ST903 is called a sub-channel service. Also, pieces of information of the television programs of the channel service ST101 are described in an event information table EIT shown in Fig. 42, pieces of 10 information of the television programs of the channel service ST103 are described in an event information table EIT shown in Fig. 43, and pieces of information of the television programs of the channel services ST900 to ST903 are respectively described in an event information table EIT shown in Fig. 44. 15

20

25

In the service description table SDT shown in Fig. 41, an identifier "main" is written in a main/sub column of each of the channel services ST101 and ST103 to classify each of the

channel services ST101 and ST103 as a main channel service, an identifier "sub" is written in a main/sub column of each of the channel services ST900, ST901, ST902 and ST903 to classify each of the channel services ST900, ST901, ST902 and ST903 as 5 a sub-channel service, referential service numbers "ST900 to ST903" are written in a referential service column of the channel service ST103 to indicate that the sub-channel services ST900 to ST903 are subordinate to the channel service ST103, a referential service number "ST103" is written in a 10 referential service column of each of the channel services ST900, ST901, ST902 and ST903 to indicate that a main channel service of the sub-channel services ST900 to ST903 is the channel service ST103, a referential transport stream number "TS5" is written in a referential transport stream column of 15 the channel service ST103 to indicate that sub-channel services subordinate to the channel service ST103 are carried in the transport stream TS5, and a referential transport stream number "TS3" is written in a referential transport stream column of the transport stream TS5 to indicate that a 20 main channel service of the sub-channel services ST900 to ST903 is carried in the transform stream TS3.

Therefore, the channel services ST101 and ST103 and a group of the channel services ST900, ST901, ST902 and ST903 are hierarchically described in the service description tables SDT 25 and the event information tables EIT.

Fig. 45 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to a fifteenth embodiment of the present invention.

5 As shown in Fig. 45, an electronic program guide producing apparatus 151 comprises:

the remote control signal receiving unit 51, the tuner 52; the demodulating unit 53; the demultiplexer 54; the section decoder 55; the electronic program information storing unit 10 56; the audio-video signal decoder 57; and

a central processing unit (CPU) 152 for controlling the remote control signal receiving unit 51, the tuner 52, the demodulating unit 53, the demultiplexer 54 and the section decoder 55, controlling the audio-video signal decoder 57 to

15 display a particular television program of the particular broadcast service enterpriser on the displaying unit 44, controlling the electronic program information storing unit 56 to store electronic program information corresponding to each channel service, producing an electronic program guide, in

20 which pieces of information of a plurality of television programs are hierarchically described and arranged, in cases where a plurality of channel services are hierarchically described in a plurality of service description tables SDT and event information tables EIT of the electronic program

25 information stored in the storing unit 56, and displaying the

electronic program guide on the displaying unit 44.

In the above configuration, in cases where a plurality of channel services hierarchically described in a plurality of service description tables SDT and event information tables 5 EIT of the electronic program information are received from the broadcasting station center system, an electronic program guide, in which pieces of information of a plurality of television programs are hierarchically described and arranged, is produced and displayed.

10 Accordingly, even though a large number of channel services are transmitted as pieces of electronic program information from the broadcasting station center system to the electronic program guide producing apparatus 151 of each viewer, because the channel services are hierarchically classified into main 15 channel services and sub-channel services to classify information of television programs, the viewer can easily recognize pieces of information of a large number of television programs hierarchically described in the electronic program guide (common electronic program guide or individual 20 electronic program guide), so that the viewer can easily select a particular broadcasting station or a particular television program.

In this embodiment, pieces of information of television programs are hierarchically described in the electronic 25 program guide. However, it is applicable that a plurality of

channel services be hierarchically described in the electronic program guide.

(Sixteen Embodiment)

In this embodiment, electronic program information  
5 corresponding to the main channel services is carried in all  
transport streams (TS), and electronic program information  
corresponding to each sub-channel service is carried in a  
particular transport stream (TS) in which a plurality of  
television programs of the sub-channel service are  
10 transmitted. The correspondence between each transport stream  
and a group of channel services is determined in advance in  
the broadcasting station center system.

For example, as shown in Fig. 46, the service description  
table SDT shown in Fig. 40 and the event information tables  
15 EIT shown in Fig. 42 and Fig. 43 are carried in all transport  
streams (TS) including the transport streams TS3 and TS5, and  
the service description table SDT shown in Fig. 41 and the  
event information tables EIT shown in Fig. 44 are carried in  
the transport stream TS5.

20 Fig. 47 is a block diagram of an electronic program  
information receiving terminal including an electronic program  
guide producing apparatus according to a sixteenth embodiment  
of the present invention.

As shown in Fig. 47, an electronic program guide producing  
25 apparatus 161 comprises:

the remote control signal receiving unit 51, the tuner 52; the demodulating unit 53; the demultiplexer 54; the section decoder 55; the electronic program information storing unit 56; the audio-video signal decoder 57; and

5 a central processing unit (CPU) 162 for controlling the remote control signal receiving unit 51, the tuner 52, the demodulating unit 53, the demultiplexer 54 and the section decoder 55, controlling the audio-video signal decoder 57 to display a particular television program of the particular

10 broadcast service enterpriser on the displaying unit 44, controlling the electronic program information storing unit 56 to store electronic program information corresponding to each channel service, producing a common electronic program guide according to the electronic program information corresponding

15 to main channel services carried in all transport streams, producing an individual electronic program guide of the particular broadcast service enterpriser, in which pieces of information of a plurality of television programs are hierarchically described and arranged, according to the

20 electronic program information corresponding to sub-channel services and main channel services carried in a particular transport stream of the particular broadcast service enterpriser in cases where a plurality of channel services are hierarchically described in a plurality of service description

25 tables SDT and event information tables EIT of the electronic

program information stored in the storing unit 56, and displaying the common electronic program guide and the individual electronic program guide on the displaying unit 44.

In the above configuration, a common electronic program 5 guide is produced according to the electronic program information corresponding to main channel services carried in all transport streams, an individual electronic program guide of the particular broadcast service enterpriser is produced according to the electronic program information corresponding 10 to all sub-channel services and all main channel services carried in a particular transport stream of the particular broadcast service enterpriser, and the common electronic program guide and the individual electronic program guide are displayed.

15 For example, a common electronic program guide is produced according to the electronic program information of the channel services ST101 and ST103 carried in the transport stream TS3 and pieces of electronic program information corresponding to other main channel services, and an individual electronic 20 program guide is produced according to the electronic program information of the channel services ST101, ST103, ST900, ST901, ST902 and ST903 carried in the transport stream TS5.

Accordingly, a common electronic program guide and an individual electronic program guide can be easily produced and 25 displayed.

(Seventeenth Embodiment)

In this embodiment, a broadcast service enterpriser provides television programs of a plurality of channel services carried in a plurality of transport streams for each viewer, and a plurality of main channel services respectively have a group of sub-channel services. In this case, electronic program information corresponding to each group of sub-channel services of the broadcast service enterpriser is carried in each of all transport streams of the broadcast service enterpriser.

For example, as shown in Fig. 48, channel services ST101 and ST103 of television programs provided by a first broadcast service enterpriser are carried in a transport stream TS3, a group of sub-channel services ST900, ST901, ST902 and ST903 subordinate to the channel service ST103 is carried in a transport stream TS5, a channel service ST105 of television programs provided by the first broadcast service enterpriser is carried in a transport stream TS6, a group of sub-channel services ST910 and ST911 subordinate to the channel service ST105 is carried in a transport stream TS7, and a channel service ST106 of television programs provided by a second broadcast service enterpriser is carried in a transport stream TS7. In this case, electronic program information corresponding to a first group of sub-channel services ST900, ST901, ST902 and ST903 is carried not only in the transport

stream TS5 but also in each of the transport streams TS3, TS6 and TS7, and electronic program information corresponding to a second group of sub-channel services ST910 and ST911 is carried not only in the transport stream TS7 but also in each 5 of the transport streams TS3, TS5 and TS. The correspondence between each broadcast service enterpriser and a group of channel services is determined in advance in the broadcasting station center system.

Fig. 49 is a block diagram of an electronic program 10 information receiving terminal including an electronic program guide producing apparatus according to a seventeenth embodiment of the present invention.

As shown in Fig. 49, an electronic program guide producing apparatus 171 comprises:

15 the remote control signal receiving unit 51, the tuner 52; the demodulating unit 53; the demultiplexer 54; the section decoder 55; the electronic program information storing unit 56; the audio-video signal decoder 57; and a central processing unit (CPU) 172 for controlling the 20 remote control signal receiving unit 51, the tuner 52, the demodulating unit 53, the demultiplexer 54 and the section decoder 55, controlling the audio-video signal decoder 57 to display a particular television program of the particular broadcast service enterpriser on the displaying unit 44, 25 controlling the electronic program information storing unit 56

to store electronic program information corresponding to each channel service, producing a common electronic program guide according to the electronic program information corresponding to main channel services carried in all transport streams,

5 producing an individual electronic program guide of the particular broadcast service enterpriser, in which pieces of information of a plurality of television programs are hierarchically described and arranged, according to the electronic program information corresponding to all groups of

10 sub-channel services and all main channel services carried in one transport stream of the particular broadcast service enterpriser in cases where a plurality of channel services are hierarchically described in a plurality of service description tables SDT and event information tables EIT of the electronic

15 program information stored in the storing unit 56, and displaying the common electronic program guide and the individual electronic program guide on the displaying unit 44.

In the above configuration, electronic program information corresponding to all channel services of a particular broadcast service enterpriser is carried in each of all transform streams of the particular broadcast service enterpriser. When a viewer watches a particular television program carried in a particular transform stream of the particular broadcast service enterpriser, because the

25 electronic program information corresponding to all channel

services of the particular broadcast service enterpriser is carried in the particular transform stream, an individual electronic program guide of the particular broadcast service enterpriser is produced according to the electronic program 5 information corresponding to all channel services of the particular broadcast service enterpriser. Therefore, the viewer can watch the individual electronic program guide displayed on the displaying unit 44.

Accordingly, the individual electronic program guide of the 10 particular broadcast service enterpriser, in which information corresponding to all groups of sub-channel services carried in one transport stream of the particular broadcast service enterpriser is included, can be produced and displayed.

(Eighteenth Embodiment)

15 In this embodiment, in cases where a viewer selects a particular channel service (or a particular television channel) having a group of sub-channel services subordinate to the particular channel service, an electronic program guide of television programs corresponding to the group of sub-channel 20 services is displayed.

Fig. 50 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to an eighteenth embodiment of the present invention.

25 As shown in Fig. 50, an electronic program guide producing

apparatus 181 comprises:

the remote control signal receiving unit 51, the tuner 52; the demodulating unit 53; the demultiplexer 54; the section decoder 55; the electronic program information storing unit

5 56; the audio-video signal decoder 57; and

a central processing unit (CPU) 182 for controlling the remote control signal receiving unit 51, the tuner 52, the demodulating unit 53, the demultiplexer 54 and the section decoder 55, controlling the audio-video signal decoder 57 to

10 display a particular television program of the particular broadcast service enterpriser on the displaying unit 44,

controlling the electronic program information storing unit 56 to store electronic program information corresponding to each channel service, producing an electronic program guide, in

15 which pieces of information of television programs of a plurality of main channel services are described, in cases where one or more channel services are hierarchically described in a plurality of service description tables SDT and event information tables EIT of the electronic program

20 information stored in the storing unit 56, producing a subordinate electronic program guide, in which pieces of information of television programs of a group of sub-channel services are described, displaying the electronic program guide on the displaying unit 44, and displaying one

25 subordinate electronic program guide of a group of sub-channel

services subordinate to a particular main channel service in cases where the particular main channel service of the electronic program guide displayed is selected by a viewer.

In the above configuration, an electronic program guide, 5 in which pieces of information of television programs of a plurality of main channel services are described, is produced. Also, a subordinate electronic program guide, in which pieces of information of television programs of a group of sub-channel services subordinate to one main channel service are 10 described, is produced for each main channel service.

For example, channel services subordinate to each main channel service and a transport stream of the channel services are specified by referring identification numbers of referential channels services and an identification number of 15 a referential transport stream described in the service description table shown in Fig. 40 or Fig. 41, and information of the group of sub-channel services subordinate to the main channel service is obtained from the event information table EIT shown in Fig. 44.

20 Thereafter, the electronic program guide is displayed on the displaying unit 44. An example of the electronic program guide is shown in Fig. 51A. When a viewer selects a particular channel service of the electronic program guide, a particular subordinate electronic program guide corresponding to the 25 particular channel service is automatically displayed on the

displaying unit 44. An example of the subordinate electronic program guide is shown in Fig. 51B. As shown in Fig. 51A, when a television channel CH33 is selected as a particular main channel service, information of television programs of a plurality of television channels CH50 to CH55 is displayed as a particular subordinate electronic program guide.

In cases where the particular main channel service has no sub-channel service, any subordinate electronic program guide is not displayed.

Accordingly, even though there are a large number of channel services, because a plurality of electronic program guides of television programs of the channel services are hierarchically classified, the viewer can easily select an electronic program guide of desired television programs, so that the viewer can easily specify a particular television program of a particular broadcast service enterpriser.

Also, even though one or more channel services or television channels are added to an electronic program guide, the additional channel services or television channels can be easily arranged in the electronic program guide.

In this embodiment, a channel service is selected by the viewer. However, it is applicable that a television channel be directly selected.

(Nineteenth Embodiment)

In this embodiment, as shown in Fig. 52, a default sub-

channel service selecting flag is set for each sub-channel service in the service description table SDT, and the default sub-channel service selecting flag is set to "on" in one of the sub-channel services. Therefore, when a viewer selects the 5 sub-channel services, a particular sub-channel service, in which a default sub-channel service selecting flag is set to "on", is automatically selected, and a particular television channel corresponding to the particular sub-channel service is selected.

10 Fig. 53 is a block diagram of an electronic program information receiving terminal including an electronic program guide producing apparatus according to a nineteenth embodiment of the present invention.

15 As shown in Fig. 53, an electronic program guide producing apparatus 191 comprises:

the remote control signal receiving unit 51, the tuner 52; the demodulating unit 53; the demultiplexer 54; the section decoder 55; the electronic program information storing unit 56; the audio-video signal decoder 57; and

20 a central processing unit (CPU) 192 for controlling the remote control signal receiving unit 51, the tuner 52, the demodulating unit 53, the demultiplexer 54 and the section decoder 55, controlling the electronic program information storing unit 56 to store electronic program information 25 corresponding to each channel service, producing an electronic

program guide, in which pieces of information of television programs of a plurality of main channel services are described, in cases where one or more channel services are hierarchically described in a plurality of service description 5 tables SDT and event information tables EIT of the electronic program information stored in the storing unit 56 and a default sub-channel service selecting flag is set in the event information table EIT of sub-channel services for each sub-channel service, producing a subordinate electronic program 10 guide, in which pieces of information of television programs of a group of sub-channel services are described, displaying the electronic program guide on the displaying unit 44, and controlling the audio-video signal decoder 57 to display a particular television program currently broadcasted in a 15 particular sub-channel service on the displaying unit 44, on condition that a default sub-channel service selecting flag is set to "on" for the particular sub-channel service which is one of sub-channel services subordinate to a particular main channel service, in cases where the particular main channel 20 service of the electronic program guide displayed is selected by a viewer.

In the above configuration, when the viewer selects a particular main channel service of the electronic program guide displayed, a plurality of sub-channel services 25 subordinate to the particular main channel service is

specified, a particular sub-channel service, in which a default sub-channel service selecting flag is set to "on", is automatically selected from the sub-channel services, and a particular television program currently broadcasted in the 5 particular sub-channel service is displayed on the displaying unit 44.

Accordingly, because each broadcast service enterpriser can specify a particular sub-channel service automatically selected, the broadcast service enterpriser can make the 10 viewer select the most important sub-channel service determined by the broadcast service enterpriser. Therefore, an advertisement effect can be increased.

(Twentieth Embodiment)

In this embodiment, as shown in Fig. 54, a viewer attribute 15 such as an age of the viewer or a residential district of the viewer is set for each sub-channel service in the service description table SDT.

Fig. 55 is a block diagram of an electronic program information receiving terminal including an electronic program 20 guide producing apparatus according to a twentieth embodiment of the present invention.

As shown in Fig. 55, an electronic program guide producing apparatus 201 comprises:

the remote control signal receiving unit 51, the tuner 52; 25 the demodulating unit 53; the demultiplexer 54; the section

decoder 55; the electronic program information storing unit 56; the audio-video signal decoder 57; and a central processing unit (CPU) 202 for controlling the remote control signal receiving unit 51, the tuner 52, the 5 demodulating unit 53, the demultiplexer 54 and the section decoder 55, controlling the electronic program information storing unit 56 to store electronic program information corresponding to each channel service, producing an electronic program guide, in which pieces of information of television 10 programs of a plurality of main channel services are described, in cases where one or more channel services are hierarchically described in a plurality of service description tables SDT and event information tables EIT of the electronic program information stored in the storing unit 56 and a viewer 15 attribute is set in the event information table EIT of sub-channel services for each sub-channel service, producing a subordinate electronic program guide, in which pieces of information of television programs of a group of sub-channel services are described, displaying the electronic program 20 guide on the displaying unit 44, and controlling the audio-video signal decoder 57 to display a particular television program currently broadcasted in a particular sub-channel service on the displaying unit 44, on condition that a viewer attribute of the particular sub-channel service subordinate to 25 a particular main channel service agrees with an attribute

input by the viewer, in cases where the particular main channel service of the electronic program guide displayed is selected by the viewer.

In the above configuration, as shown in Fig. 54, when the 5 viewer selects the main channel service ST103, a viewer attribute of each sub-channel service subordinate to the main channel service ST103 compares with an attribute input by the viewer, and a particular sub-channel service, in which a viewer attribute agrees with the attribute input by the 10 viewer, is automatically selected. For example, in cases where an age of the viewer is 65 years old, a particular sub-channel service TS902 is selected. Thereafter, a particular television program currently broadcasted in the particular sub-channel service is displayed on the displaying unit 44.

15 Accordingly, because one sub-channel service is automatically selected from a plurality of sub-channel services by inputting the attribute of the viewer, the viewer can easily select a sub-channel service suitable for the viewer without any troublesomeness.

20 Also, each broadcast service enterpriser can select a limited group of viewers from a large number of viewers to make the limited group of viewers watch television programs of a particular sub-channel service according to a common attribute of the limited group of viewers.

25 (Twenty-First Embodiment)

In this embodiment, as shown in Fig. 56, a genre such as movie, sports or news is set for each sub-channel service in the service description table SDT. Also, a viewer genre suitable for the viewer is registered in advance in the 5 broadcasting station center system or is determined in the broadcasting station center system according to television program viewing records of the viewer.

Fig. 57 is a block diagram of an electronic program information receiving terminal including an electronic program 10 guide producing apparatus according to a twenty-first embodiment of the present invention.

As shown in Fig. 57, an electronic program guide producing apparatus 211 comprises:

the remote control signal receiving unit 51, the tuner 52; 15 the demodulating unit 53; the demultiplexer 54; the section decoder 55; the electronic program information storing unit 56; the audio-video signal decoder 57; and a central processing unit (CPU) 212 for controlling the remote control signal receiving unit 51, the tuner 52, the 20 demodulating unit 53, the demultiplexer 54 and the section decoder 55, controlling the electronic program information storing unit 56 to store electronic program information corresponding to each channel service, producing an electronic program guide, in which pieces of information of television 25 programs of a plurality of main channel services are

described, in cases where one or more channel services are hierarchically described in a plurality of service description tables SDT and event information tables EIT of the electronic program information stored in the storing unit 56 and a genre 5 is set in the event information table EIT of sub-channel services for each sub-channel service, producing a subordinate electronic program guide, in which pieces of information of television programs of a group of sub-channel services are described, displaying the electronic program guide on the 10 displaying unit 44, and controlling the audio-video signal decoder 57 to display a particular television program currently broadcasted in a particular sub-channel service on the displaying unit 44, on condition that a genre of the particular sub-channel service subordinate to a particular 15 main channel service agrees with a viewer genre, in cases where the particular main channel service of the electronic program guide displayed is selected by the viewer.

In the above configuration, as shown in Fig. 56, when the viewer selects the main channel service ST103, a genre of each 20 sub-channel service subordinate to the main channel service ST103 compares with a viewer genre, and a particular sub-channel service, in which a genre agrees with the viewer genre, is automatically selected. For example, in cases where the viewer takes interest in a "movie" genre, a particular 25 sub-channel service TS900 is selected. Thereafter, a

particular television program currently broadcasted in the particular sub-channel service is displayed on the displaying unit 44.

Accordingly, because one sub-channel service is  
5 automatically selected from a plurality of sub-channel services, the viewer can easily select a sub-channel service suitable for the viewer without any Troublesomeness.

Having illustrated and described the principles of the present invention in a preferred embodiment thereof, it should  
10 be readily apparent to those skilled in the art that the invention can be modified in arrangement and detail without departing from such principles. We claim all modifications coming within the scope of the accompanying claims.

WHAT IS CLAIMED IS:

1. An electronic program information preparing and transmitting apparatus, comprising:

    electronic program information preparing means for

5    preparing general electronic program information, in which electronic program information of a plurality of broadcast service enterprisers is described on a general level, and preparing individual electronic program information, in which the electronic program information of one broadcast service 10 enterpriser is described on an individual level, for each broadcast service enterpriser; and

    electronic program information transmitting means for

transmitting the general electronic program information of the broadcast service enterprisers and the individual electronic 15 program information of the broadcast service enterprisers prepared by the electronic program information preparing means.

2. An electronic program information preparing and

20    transmitting apparatus according to claim 1 in which the general electronic program information and the individual electronic program information corresponding to each broadcast service enterpriser are prepared according to electronic program information detailed degree setting 25 information which indicates a detailed degree of the

individual electronic program information described on the individual level and a detailed degree of the general electronic program information described on the general level.

5 3. An electronic program information preparing and transmitting apparatus according to claim 1 in which the general level corresponds to a low detailed degree, and the individual level corresponds to a high detailed degree.

10 4. An electronic program information preparing and transmitting apparatus according to claim 1 in which the electronic program information transmitting means comprises:

15 electronic program information outputting means for outputting the general electronic program information of the broadcast service enterprisers and the individual electronic program information of the broadcast service enterprisers prepared by the electronic program information preparing means; and

20 electronic program information multiplexing means for multiplexing the general electronic program information of the broadcast service enterprisers and one piece of individual electronic program information of one broadcast service enterpriser output by the electronic program information 25 outputting means to produce combined electronic program

information for each piece of individual electronic program information, and transmitting each piece of combined electronic program information to a viewer through a transmission line.

5

5. An electronic program information preparing and transmitting apparatus according to claim 1 in which transport stream specifying information indicating a transport stream is prepared by the electronic program information preparing means 10 for each piece of individual electronic program information of one broadcast service enterpriser, and the electronic program information transmitting means comprises:

electronic program information outputting means for 15 outputting the pieces of general electronic program information of the broadcast service enterprisers, the pieces of individual electronic program information of the broadcast service enterprisers and the pieces of transport stream specifying information prepared by the electronic program 20 information preparing means; and

electronic program information multiplexing means for multiplexing the pieces of general electronic program information of the broadcast service enterprisers and one piece of individual electronic program information of one 25 broadcast service enterpriser output by the electronic program

information outputting means to produce combined electronic program information for each piece of individual electronic program information, carrying each piece of combined electronic program information in a transport stream, which is

5 indicated by the piece of transport stream specifying information corresponding to the piece of individual electronic program information multiplexed in the piece of combined electronic program information, and transmitting the pieces of combined electronic program information carried in

10 the transport streams to the viewer.

6. An electronic program information preparing and transmitting apparatus according to claim 5 in which enterpriser service correspondence information, which

15 indicates the correspondence between each broadcast service enterpriser and a channel service carried in one transport stream is prepared by the electronic program information preparing means, and the transport stream specifying information is prepared according to the enterpriser service

20 correspondence information.

7. An electronic program information preparing and transmitting apparatus according to claim 6 in which one or more television programs provided by each broadcast service

25 enterpriser are carried in one transport stream of the

broadcast service enterpriser and are broadcasted on the viewer side, and the transport stream for carrying each piece of combined electronic program information, in which one piece of individual electronic program information corresponding to 5 one broadcast service enterpriser is multiplexed, agrees with that of the broadcast service enterpriser.

8. An electronic program information preparing and transmitting apparatus according to claim 1 in which one piece 10 of individual electronic program information of a particular broadcast service enterpriser and pieces of general electronic program information of broadcast service enterprisers other than the particular broadcast service enterpriser are transmitted to the viewer for each piece of individual 15 electronic program information by the electronic program information transmitting means.

9. An electronic program information preparing and transmitting apparatus according to claim 1 in which 20 the electronic program information preparing means comprises:  
common electronic program information preparing means for preparing common electronic program information;  
non-common electronic program information preparing means for preparing first non-common electronic program information 25 not common to the broadcast service enterprisers on the

individual level from the electronic program information of one broadcast service enterpriser for each broadcast service enterpriser and preparing second non-common electronic program information not common to the broadcast service enterprisers

5 on the general level from the electronic program information of one broadcast service enterpriser for each broadcast service enterpriser, and

the electronic program information transmitting means comprises:

10 electronic program information multiplexing means for multiplexing the common electronic program information prepared by the common electronic program information preparing means, one piece of first non-common electronic program information of a particular broadcast service

15 enterpriser prepared by the non-common electronic program information preparing means and pieces of second non-common electronic program information of broadcast service enterprisers other than the particular broadcast service enterpriser with each other to produce multiplexed electronic

20 program information for each particular broadcast service enterpriser; and

multiplexed electronic program information transmitting means for transmitting the multiplexed electronic program information produced by the electronic program information

25 multiplexing means to the viewer for each particular broadcast

service enterpriser.

10. An electronic program information preparing and transmitting apparatus according to claim 9 in which transport stream specifying information indicating a transport stream is prepared by the non-common electronic program information preparing means for each broadcast service enterpriser, and the multiplexed electronic program information, in which one piece of first non-common electronic program information of one broadcast service enterpriser is multiplexed, is carried in the transport stream indicated by the transport stream specifying information corresponding to the broadcast service enterpriser.

15 11. An electronic program information preparing and transmitting apparatus according to claim 1 in which a plurality of channel services are listed in the general electronic program information or in the individual electronic program information of one broadcast service enterpriser prepared by the electronic program information preparing means, and service specifying information indicating the specifying of a particular channel service is arranged in the general electronic program information or the individual electronic program information of the broadcast service enterpriser to automatically select the particular channel

service from the channel services in cases where the broadcast service enterpriser is selected.

12. An electronic program information preparing and  
5 transmitting apparatus according to claim 11 in which a viewer attribute is arranged in the general electronic program information or in the individual electronic program information as the service specifying information, a particular channel service, of which a viewer attribute agrees  
10 with an attribute of the viewer, being selected from the channel services.

13. An electronic program information preparing and transmitting apparatus according to claim 11 in which a genre  
15 is arranged in the general electronic program information or in the individual electronic program information as the service specifying information, a particular channel service, of which a genre agrees with a viewer favorite genre, being selected from the channel services.

20

14. An electronic program information preparing and transmitting apparatus according to claim 1 in which pieces of information of a plurality of television programs are described in the individual electronic program information or  
25 the general electronic program information, and program link

describing information indicating that an actual television program actually broadcasted is the same as one or more virtual television programs not actually broadcasted is arranged in the individual electronic program information or 5 the general electronic program information.

15. An electronic program information preparing and transmitting apparatus according to claim 14 in which reference information for referring to information of an 10 actual television program actually broadcasted is added to information of one or more virtual television programs not actually broadcasted, and the reference information is transmitted.

15 16. An electronic program information preparing and transmitting apparatus according to claim 1 in which pieces of information of one or more television programs are listed in the general electronic program information or the individual electronic program information of each broadcast service 20 enterpriser prepared by the electronic program information preparing means, and a transmission bandwidth is described as the information of each television program.

17. An electronic program information preparing and 25 transmitting apparatus according to claim 16 in which

information indicating one broadcast service enterpriser,  
information of a schedule and information of a television  
channel are described as the information of each television  
program on condition that a display width of each television  
5 program is proportional to the transmission bandwidth of the  
television program.

18. An electronic program information preparing and  
transmitting apparatus according to claim 1 in which one or  
10 more main channel services and one or more sub-channel  
services subordinate to one main channel service are  
hierarchically listed in the general electronic program  
information or in the individual electronic program  
information prepared by the electronic program information  
15 preparing means.

19. An electronic program information preparing and  
transmitting apparatus according to claim 1 in which one or  
more main television programs and one or more sub-television  
20 programs subordinate to one main television program are  
hierarchically listed in the general electronic program  
information or the individual electronic program information  
prepared by the electronic program information preparing  
means.

20. An electronic program information preparing and transmitting apparatus according to claim 1 in which one or more main television programs or main channel services and one or more sub-television programs or sub-channel services

5 subordinate to one main television program or main channel service are hierarchically listed in the general electronic program information or the individual electronic program information prepared by the electronic program information preparing means, broadcasting times of the sub-television

10 programs or sub-channel services subordinate to the main television program or main channel service are the same as each other, and the main television program or main channel service is not actually broadcasted.

15 21. An electronic program information preparing and transmitting apparatus according to claim 18 in which the general electronic program information including information of the main channel services is transmitted through all transmission lines, and the individual electronic program

20 information including information of the sub-channel services is transmitted through a particular transmission line in which television programs of the sub-channel services are actually transmitted.

25 22. An electronic program information preparing and

transmitting apparatus according to claim 18 in which television programs provided by a particular broadcast service enterpriser are carried in a plurality of particular transmission lines, television programs of the sub-channel services are transmitted through one particular transmission line, the general electronic program information including information of the main channel services is transmitted through all transport streams, and the individual electronic program information including information of the sub-channel services is transmitted through each of the particular transmission lines.

23. An electronic program information preparing and transmitting apparatus according to claim 18 in which sub-channel service specifying information is arranged in the general electronic program information or in the individual electronic program information to specify a particular sub-channel service selected from the sub-channel services in cases where the main channel service of the sub-channel services is tuned by the viewer.

24. An electronic program information preparing and transmitting apparatus according to claim 18 in which a viewer attribute is arranged as information of each sub-channel service, a particular sub-channel service, of which the viewer

attribute agrees with an attribute of the viewer, being selected from the sub-channel services.

25. An electronic program information preparing and  
5 transmitting apparatus according to claim 18 in which a genre is arranged as information of each sub-channel service, a particular sub-channel service, of which the genre agrees with a viewer favorite genre, being selected from the sub-channel services.

10

26. An electronic program information preparing and transmitting method, comprising the steps of:

preparing general electronic program information described on a general level from electronic program information of a  
15 plurality of broadcast service enterprisers;

preparing individual electronic program information described on an individual level from the electronic program information of one broadcast service enterpriser for each broadcast service enterpriser; and

20 transmitting the general electronic program information of the broadcast service enterprisers and the individual electronic program information of the broadcast service enterprisers.

25 27. An electronic program information preparing and

transmitting method according to claim 26 in which the step of preparing individual electronic program information comprising the steps of:

5       preparing a plurality of information tables corresponding to a plurality of channel services as the individual electronic program information of each broadcast service enterpriser;

10      describing pieces of information of a plurality of television programs in each information table;

15      arranging program link describing information as the information of one television program for each information table to indicate that an actual television program actually broadcasted is the same as one or more virtual television programs not actually broadcasted.

15

28. An electronic program information preparing and transmitting method according to claim 26 in which the step of preparing individual electronic program information comprising the step of:

20      hierarchically listing one or more main channel services and one or more sub-channel services subordinate to one main channel service in the individual electronic program information.

25   29. An electronic program guide producing apparatus,

comprising:

electronic program information receiving means for receiving electronic program information of a plurality of broadcast service enterprisers;

5 common electronic program guide producing means for producing a common electronic program guide of channel services provided by the broadcast service enterprisers from the electronic program information of the broadcast service enterprisers received by the electronic program information 10 receiving means; and

individual electronic program guide producing means for producing an individual electronic program guide of channel services provided by one broadcast service enterpriser from the electronic program information of the broadcast service 15 enterpriser received by the electronic program information receiving means for each broadcast service enterpriser.

30. An electronic program guide producing apparatus according to claim 29, further comprising:

20 displaying means for displaying a television program of a channel service provided by a particular broadcast service enterpriser selected from the broadcast service enterprisers, displaying the common electronic program guide produced by the common electronic program guide producing means regardless of 25 the particular broadcast service enterpriser, and displaying a

particular individual electronic program guide of the particular broadcast service enterpriser produced by the individual electronic program guide producing means while displaying the television program of the channel service 5 provided by the particular broadcast service enterpriser.

31. An electronic program guide producing apparatus according to claim 30 in which a plurality of channel services are listed in the electronic program information of one broadcast 10 service enterpriser received by the electronic program information receiving means, service specifying information indicating the specifying of a particular channel service selected from the channel services is arranged in the electronic program information, and a television program of 15 the particular channel service of the broadcast service enterpriser is automatically displayed by the displaying means in cases where the viewer selects the broadcast service enterpriser.

20 32. An electronic program guide producing apparatus according to claim 30 in which a plurality of channel services are listed in one individual electronic program guide produced by the individual electronic program guide producing means or in the common electronic program guide produced by the common 25 electronic program guide producing means, a viewer attribute

is arranged as information of each channel service of the individual electronic program guide or the common electronic program guide, and a television program of a particular channel service of the broadcast service enterpriser is

5 automatically displayed by the displaying means in cases where the viewer attribute of the particular channel service agrees with an attribute of the viewer in the individual electronic program guide or the common electronic program guide.

10 33. An electronic program guide producing apparatus according to claim 30 in which a plurality of channel services are listed in one individual electronic program guide produced by the individual electronic program guide producing means or in the common electronic program guide produced by the common

15 electronic program guide producing means, a genre is arranged as information of each channel service of the individual electronic program guide or the common electronic program guide, and a television program of a particular channel service of the broadcast service enterpriser is automatically

20 displayed by the displaying means in cases where the genre of the particular channel service agrees with a viewer favorite genre in the individual electronic program guide or the common electronic program guide.

25 34. An electronic program guide producing apparatus according

to claim 30 in which pieces of information of a plurality of television programs are described in one individual electronic program guide produced by the individual electronic program guide producing means or in the common electronic program

5 guide produced by the common electronic program guide producing means, program link describing information indicating that an actual television program actually broadcasted is the same as one or more virtual television programs not actually broadcasted is arranged in the

10 individual electronic program guide or the common electronic program guide, and the individual electronic program guide or the common electronic program information is displayed by the displaying means.

15 35. An electronic program guide producing apparatus according to claim 30 in which information of a particular program extending over a plurality of television channels is described in one individual electronic program guide produced by the individual electronic program guide producing means or in the

20 common electronic program guide produced by the common electronic program guide producing means, and the information of the particular program is displayed by the displaying means as the individual electronic program guide or the common electronic program guide.

36. An electronic program guide producing apparatus according to claim 30 in which information of a particular television program extending over a plurality of television channels is described in one individual electronic program guide produced by the individual electronic program guide producing means or the common electronic program guide produced by the common electronic program guide producing means, the information of the particular television program is described in each television channel of the individual electronic program guide or the common electronic program guide, the information of the particular television program described in each television channel is displayed by the displaying means as the individual electronic program guide or the common electronic program guide, and the selection of the particular television program is visually indicated in each television channel in cases where the particular television program of one television channel is selected.

37. An electronic program guide producing apparatus according  
20 to claim 30 in which display quality information is described  
as information of each television program in one individual  
electronic program guide produced by the individual electronic  
program guide producing means or in the common electronic  
program guide produced by the common electronic program guide  
25 producing means to indicate a display quality of the

television program, and pieces of information of the television programs are displayed by the displaying means as the individual electronic program guide or the common electronic program guide to indicate the display quality of 5 each television program according to the display quality information of the television program.

38. An electronic program guide producing apparatus according to claim 30 in which information of one broadcast service 10 enterpriser, information of a schedule and information of a television channel are described as information of each television program in one individual electronic program guide produced by the individual electronic program guide producing means or in the common electronic program guide produced by 15 the common electronic program guide producing means, a transmission bandwidth is described as information of each television program in the individual electronic program guide or the common electronic program guide, and a three-dimensional electronic program guide composed of three 20 components of the broadcast service enterpriser, the schedule and the television channel is displayed by the displaying means on condition that a display width of each television program in the three-dimensional electronic program guide is proportional to the transmission bandwidth of the television 25 program.

39. An electronic program guide producing apparatus according to claim 30 in which information of television programs is described in one individual electronic program guide produced  
5 by the individual electronic program guide producing means or in the common electronic program guide produced by the common electronic program guide producing means, the information of the television programs is displayed by the displaying means as the individual electronic program guide or the common  
10 electronic program guide while displaying a television program of one television channel, and the electronic program guide producing apparatus, further comprises:

television channel changing means for changing a television program of a first television channel to a television program  
15 of a second television channel in cases where the television program of the first television channel has no relationship with the television program of the second television channel and changing the television program of the first television channel to a television program of a third television channel  
20 in cases where the television program of the first television channel refers to the information of the television program of the second television channel, the television program of the second television channel refers to the information of the television program of the first television channel or the  
25 television programs of the first and second television

channels refers to the information of a television program of one television channel.

40. An electronic program guide producing apparatus according to claim 39 in which channel identifying information indicating the second television channel or the third television channel changed by the television channel changing means and one or more fourth television channels is displayed in cases where the second television channel or the third television channel and the fourth television channels refer to information of the same television channel, and channel identifying information indicating the second television channel or the third television channel changed by the television channel changing means and one or more fifth television channels is displayed in cases where the fifth television channels refer to information of the second television channel or information of the third television channel.

41. An electronic program guide producing apparatus according to claim 30 in which information of one or more main channel services and information of one or more sub-channel services subordinate to one main channel service are hierarchically described in one individual electronic program guide produced by the individual electronic program guide producing means or

in the common electronic program guide produced by the common electronic program guide producing means, and the information of the main channel services and the information of the sub-channel services hierarchically described are displayed by the 5 displaying means as the individual electronic program guide or the common electronic program guide.

42. An electronic program guide producing apparatus according to claim 30 in which information of one or more main 10 television programs and information of one or more sub-television programs subordinate to one main television program are hierarchically described in one individual electronic program guide produced by the individual electronic program guide producing means or the common electronic program guide 15 produced by the common electronic program guide producing means, and the information of the main television programs and the information of the sub-television programs hierarchically described are displayed by the displaying means as the individual electronic program guide or the common electronic 20 program guide.

43. An electronic program guide producing apparatus according to claim 30 in which information of a main television program and information of one or more sub-television programs 25 subordinate to the main television program are hierarchically

described in one individual electronic program guide produced by the individual electronic program guide producing means or the common electronic program guide produced by the common electronic program guide producing means, the information of 5 the main television programs is displayed by the displaying means as the individual electronic program guide, and the information of the sub-television programs is displayed by the displaying means as the individual electronic program guide or the common electronic program guide in cases where the main 10 television program or a channel service of the main television program described in the information of the main television programs is selected.

44. An electronic program guide producing apparatus according 15 to claim 30 in which information of a main television program and information of one or more sub-television programs subordinate to the main television program are hierarchically described in one individual electronic program guide produced by the individual electronic program guide producing means or the common electronic program guide produced by the common 20 electronic program guide producing means, a viewer attribute is described as information of each sub-television program, and a particular sub-television program is automatically displayed by the displaying means, on condition that the 25 viewer attribute described as the information of the

particular sub-television program agrees with an attribute of the viewer, in cases where the viewer selects the main television program.

5 45. An electronic program guide producing apparatus according to claim 30 in which information of a main television program and information of one or more sub-television programs subordinate to the main television program are hierarchically described in one individual electronic program guide produced 10 by the individual electronic program guide producing means or the common electronic program guide produced by the common electronic program guide producing means, a genre is described as information of each sub-television program, and a particular sub-television program is automatically displayed 15 by the displaying means, on condition that the genre described as the information of the particular sub-television program agrees with a viewer favorite genre, in cases where the viewer selects the main television program.

20 46. An electronic program guide producing apparatus according to claim 30 in which one of a plurality of sub-services is selected in cases where a main service is selected by the viewer.

## ABSTRACT

General electronic program information described on a general level and individual electronic program information described on an individual level are prepared according to 5 electronic program information of a channel service of a broadcast service enterpriser for each channel service according to electronic program information detailed degree setting information. The electronic program information detailed degree setting information indicates a detailed 10 degree for contents of the individual electronic program information described on the individual level and a detailed degree for contents of the general electronic program information described on the general level. The general level corresponds to a low detailed degree, and the individual level 15 corresponds to a high detailed degree. One piece of individual electronic program information of a particular channel service and pieces of general electronic program information of channel services other than the particular channel service are multiplexed and transmitted to each viewer. Accordingly, the 20 general electronic program information and the individual electronic program information can be transmitted while effectively using a data transmission band.

FIG. 1  
PRIOR ART

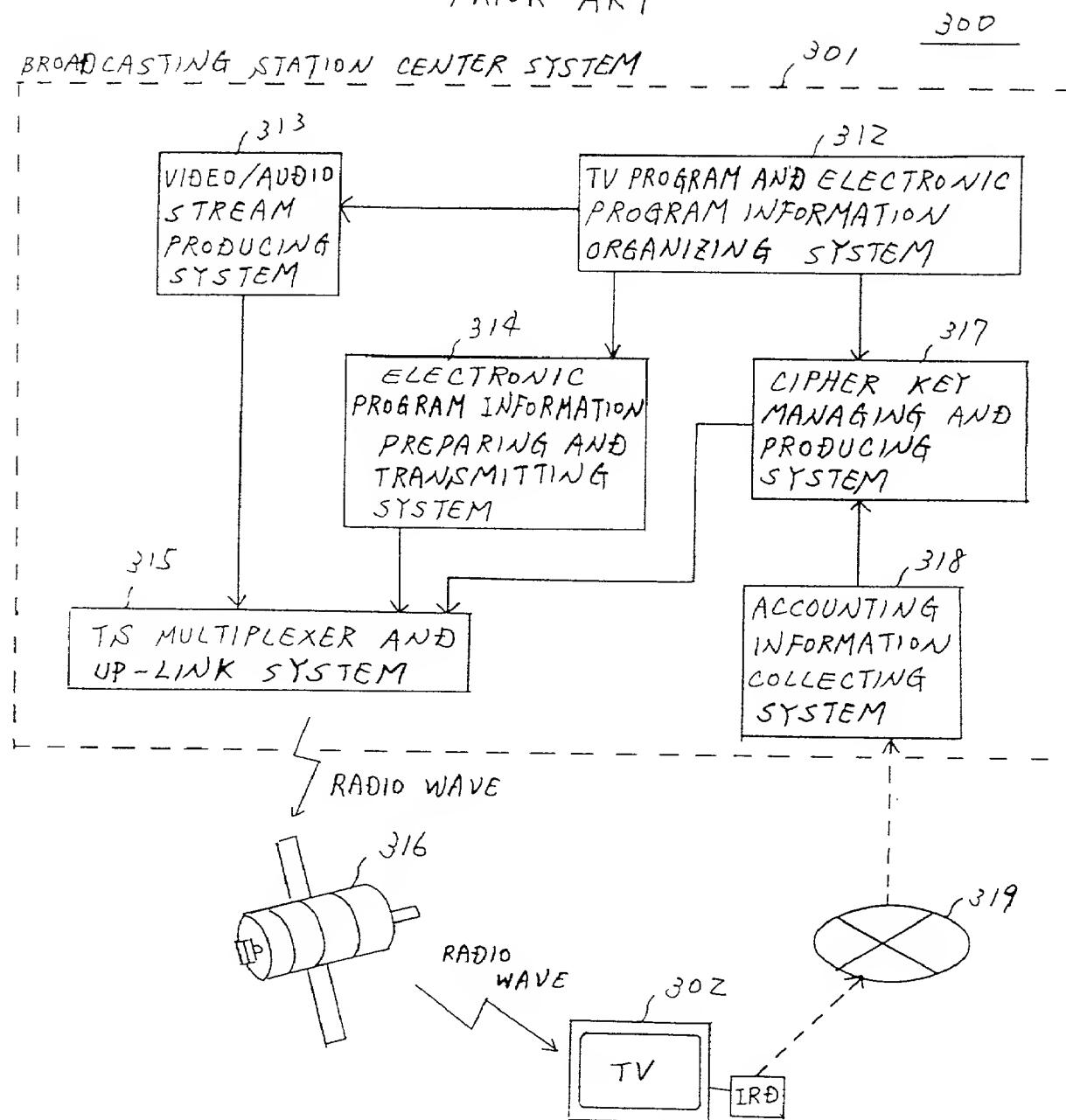




FIG. 3

SERVICE DESCRIPTION TABLE (SDT),  
INDIVIDUAL LEVEL

TS ID	TS 1
SERVICE ID	ST 100
SERVICE NAME	FUJISAN
SERVICE TYPE	SDTV
ENTERPRISER NAME	FUJISAN LTD.
LOCATION	PRE. SHIZUOKA

EVENT INFORMATION TABLE (EIT)  
INDIVIDUAL LEVEL

SERVICE ID	ST 100							
TS ID	TS 1							
EVENT ID	TP3	TP4	TP5	...	TP9	TP10	TP11	TP12
EVENT NAME								
BROADCASTING START DATE AND TIME	1/1 0:00	1/1 1:00	1/1 2:00	---	1/1 22:00	1/1 23:00	1/1 23:15	1/1 23:45
DURATION OF EVENT	60	60	30	---	60	15	30	15
CAST								
DIRECTOR								
LOCATION								
GENRE								
:								

"EVENT" DENOTES "TELEVISION PROGRAM"

FIG. 4

SERVICE DESCRIPTION TABLE (SDT)  
GENERAL LEVEL

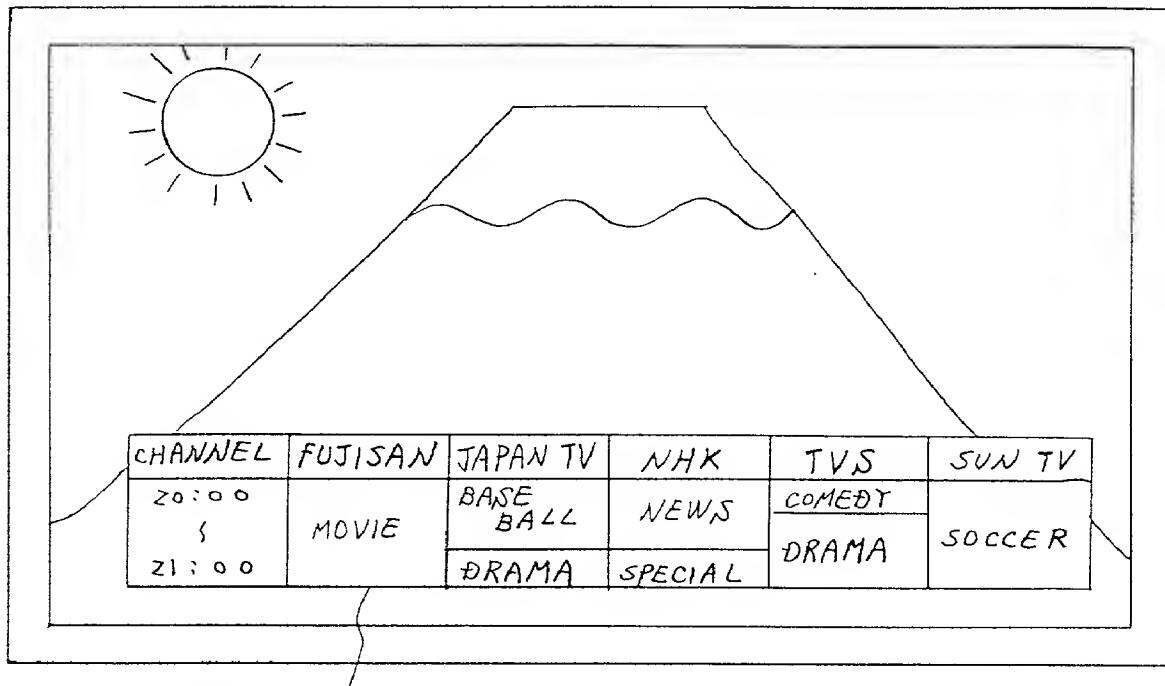
TS ID	TS 1
SERVICE ID	ST100
SERVICE NAME	FUJISAN
SERVICE TYPE	SDTV

EVENT INFORMATION TABLE (EIT)  
GENERAL LEVEL

SERVICE ID	ST100					
TS ID	TS 1					
EVENT ID	TP3	TP4	TP5	...	TP109	TP110
EVENT NAME						
BROADCASTING START DATE AND TIME	1/1 0:00	1/1 1:00	1/1 2:00	...	1/1 23:50	1/1 23:55
DURATION OF EVENT	60	60	30	...	5	5

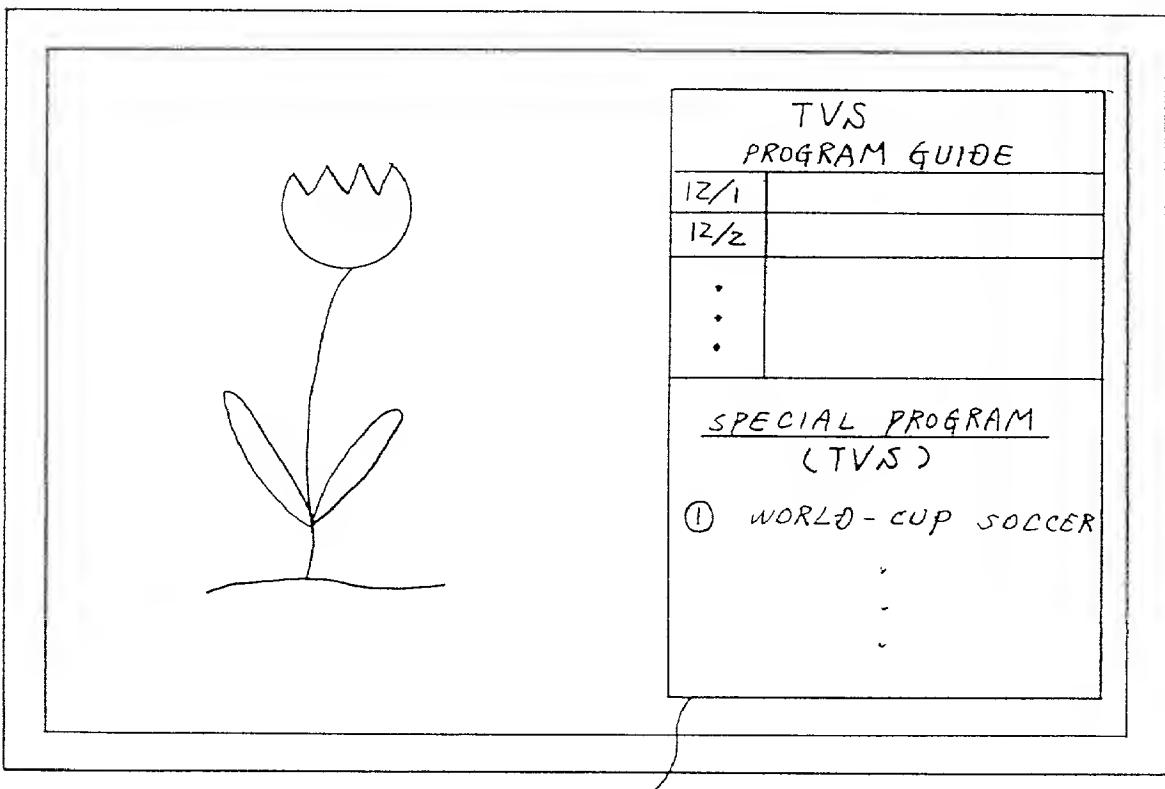
FIG. 5

5/43



COMMON ELECTRONIC PROGRAM GUIDE

FIG. 6



INDIVIDUAL ELECTRONIC PROGRAM GUIDE

Fig. 7

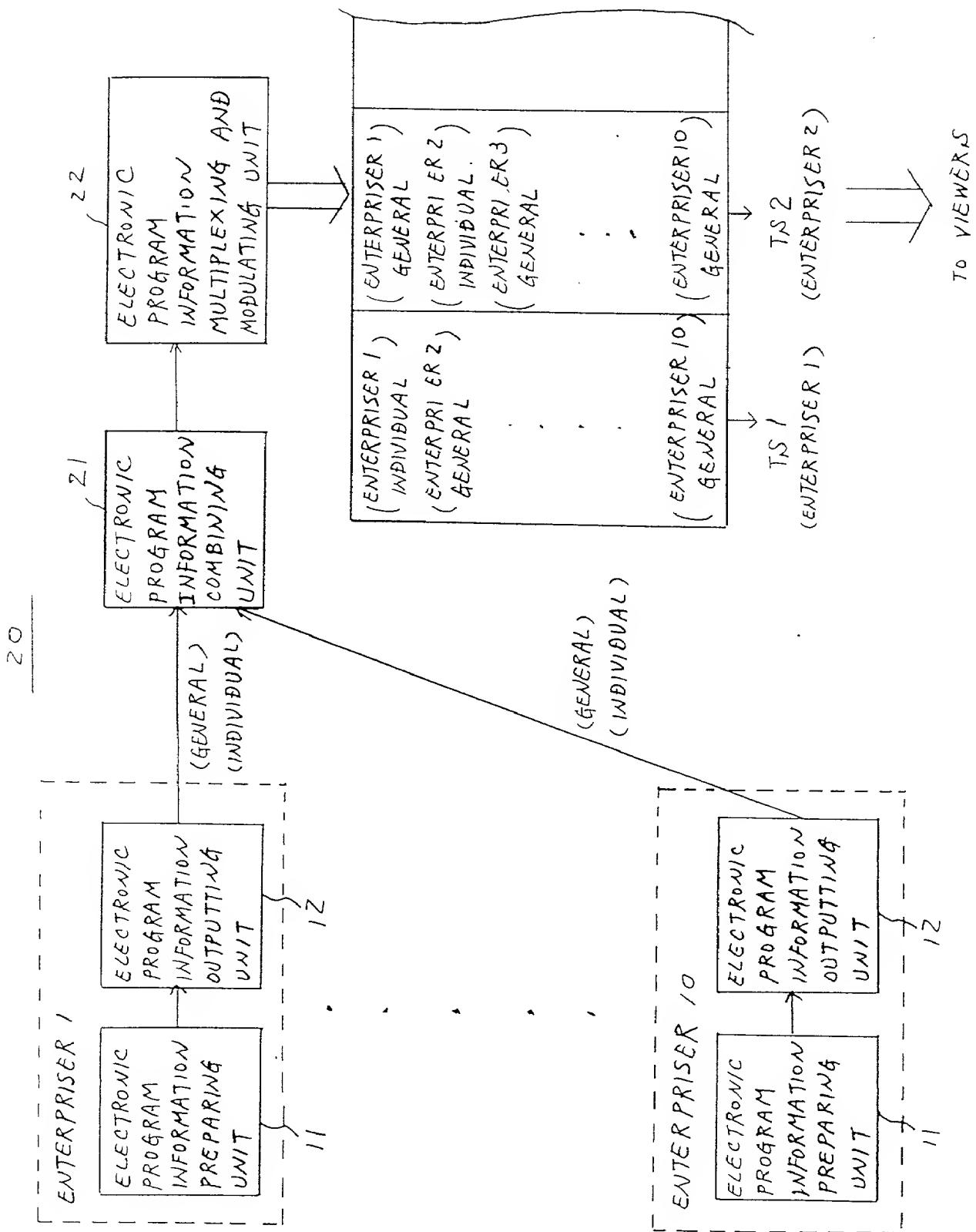




FIG. 9

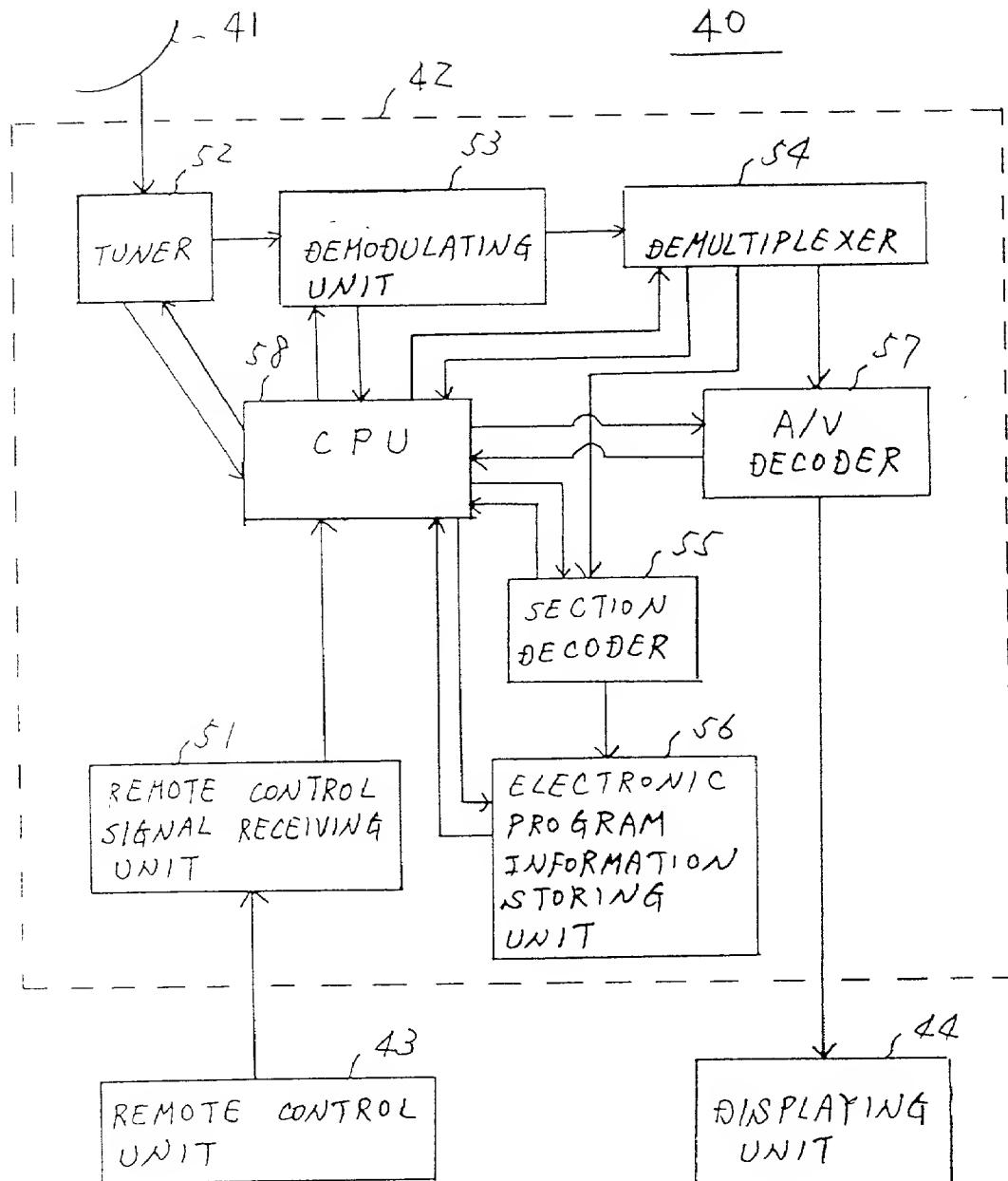


FIG. 10

## BOUQUET ASSOCIATION TABLE (BAT)

BOUQUET ID	B5		
BOUQUET NAME	Sb1		
TS ID	TS20		
SERVICE ID	ST1	ST2	ST3

BOUQUET ID	B6		
BOUQUET NAME	Sb2		
TS ID	TS30	TS40	
SERVICE ID	ST4	ST5	ST6
	ST7	ST8	ST9

## NETWORK INFORMATION TABLE (NIT)

NETWORK ID	NS		
TS ID	TS20	TS30	TS40
TUNING INFORMATION	23.5	50.1	67.8

FIG. 11

## PROGRAM ASSOCIATION TABLE (PAT)

PROGRAM No.	P1	P2	P3
PACKET ID OF PMT	PK123	PK456	PK789

## PROGRAM MAP TABLE (PMT)

PROGRAM No.	P2		
ES TYPE	VIDEO	AUDIO	AUDIO
PACKET ID OF ES	PK122	PK455	PK788

FIG. 12

EVENT INFORMATION TABLE (EIT)

SERVICE ID	ST4				
TS ID	TS30				
EVENT ID	TP30	TP35	TP40	TP42	TP89
TITLE	MORNING WEATHER	CYCLING	MORNING NEWS	MORNING VEGETABLES	GET UP!
BROADCASTING START DATE AND TIME	197 11/14 4:00	197 11/14 5:00	197 11/14 6:00	197 11/14 7:00	197 11/14 8:00
DURATION OF EVENT	60	60	60	60	60

SERVICE DESCRIPTION TABLE (SDT)

TS ID	TS30		
SERVICE ID	ST4	ST5	ST6
SERVICE NAME	MOVIE CHANNEL	CHILDREN TV	NEWS!
SERVICE TYPE	MOVOD	DIGITAL TV	FM RADIO

TS ID	TS40		
SERVICE ID	ST7	ST8	ST9
SERVICE NAME	SPORTS TV	MADAM TV	COMIC TV
SERVICE TYPE	DIGITAL TV	DIGITAL TV	DIGITAL TV

FIG. 13

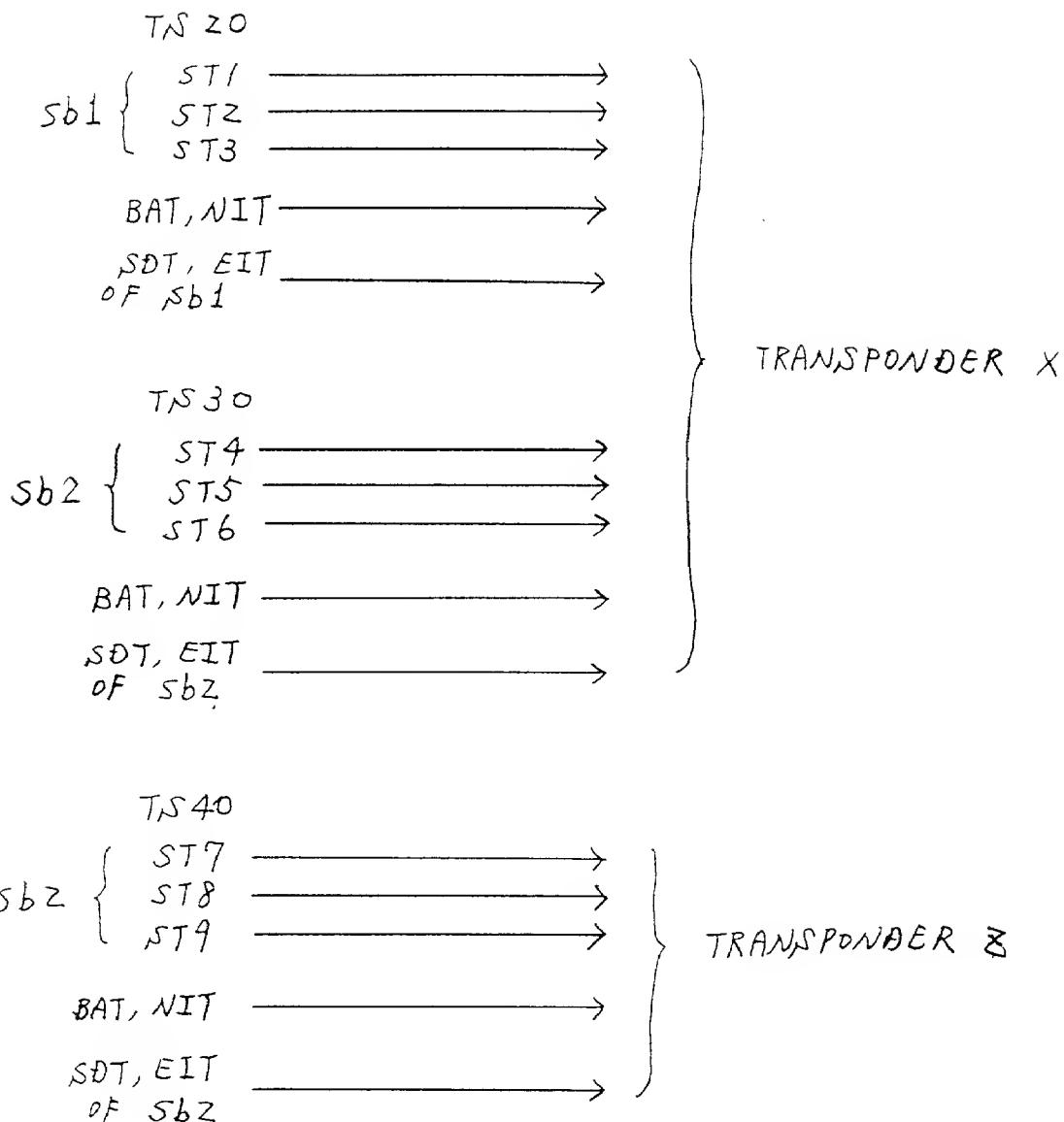


FIG. 14

## INDIVIDUAL ELECTRONIC PROGRAM GUIDE

CHANNEL SERVICE ID	ST4	ST5	ST6	ST7	ST8	ST9
SERVICE NAME	MOVIE CHANNEL	CHILDREN TV	NEWS!	SPORTS TV	MADAM TV	COMIC TV
4:00	PR1	PR5	PR9	PR13	PR17	PR21
5:00	PR2	PR6	PR10	PR14	PR18	PR22
6:00	PR3	PR7	PR11	PR15	PR19	PR23
7:00	PR4	PR8	PR12	PR16	PR20	PR24

FIG. 15

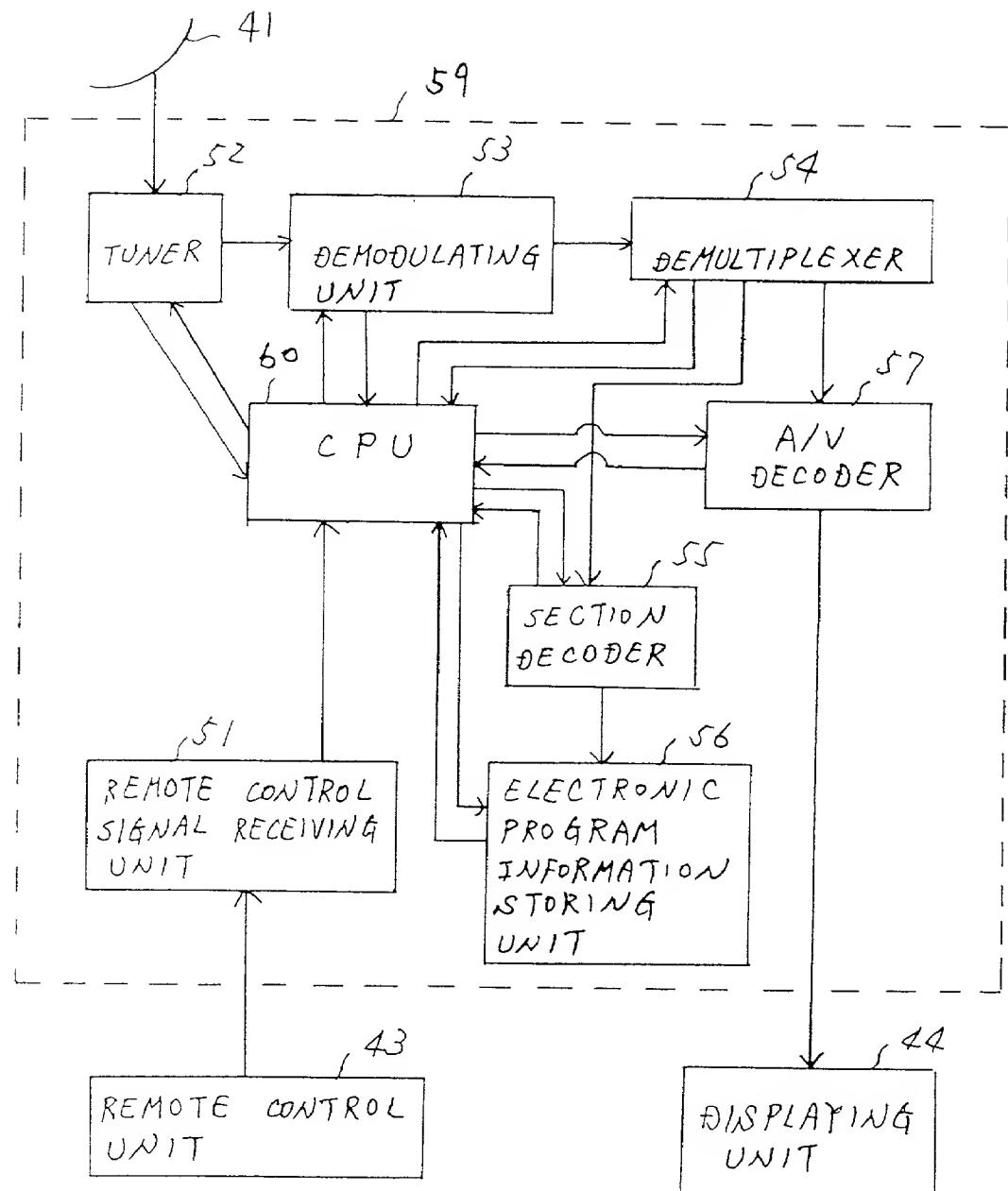


FIG. 16

## BOUQUET ASSOCIATION TABLE (BAT)

BOUQUET ID	B5		
BOUQUET NAME	sb1		
TS ID	TS.20		
SERVICE ID	ST1	ST2	ST3
DEFAULT SELECTION FLAG	ON	OFF	OFF

BOUQUET ID	B6					
BOUQUET NAME	sb2					
TS ID	TS30			TS40		
SERVICE ID	ST4	ST5	ST6	ST7	ST8	ST9
DEFAULT SELECTION FLAG	ON	OFF	OFF	OFF	OFF	OFF

FIG. 17

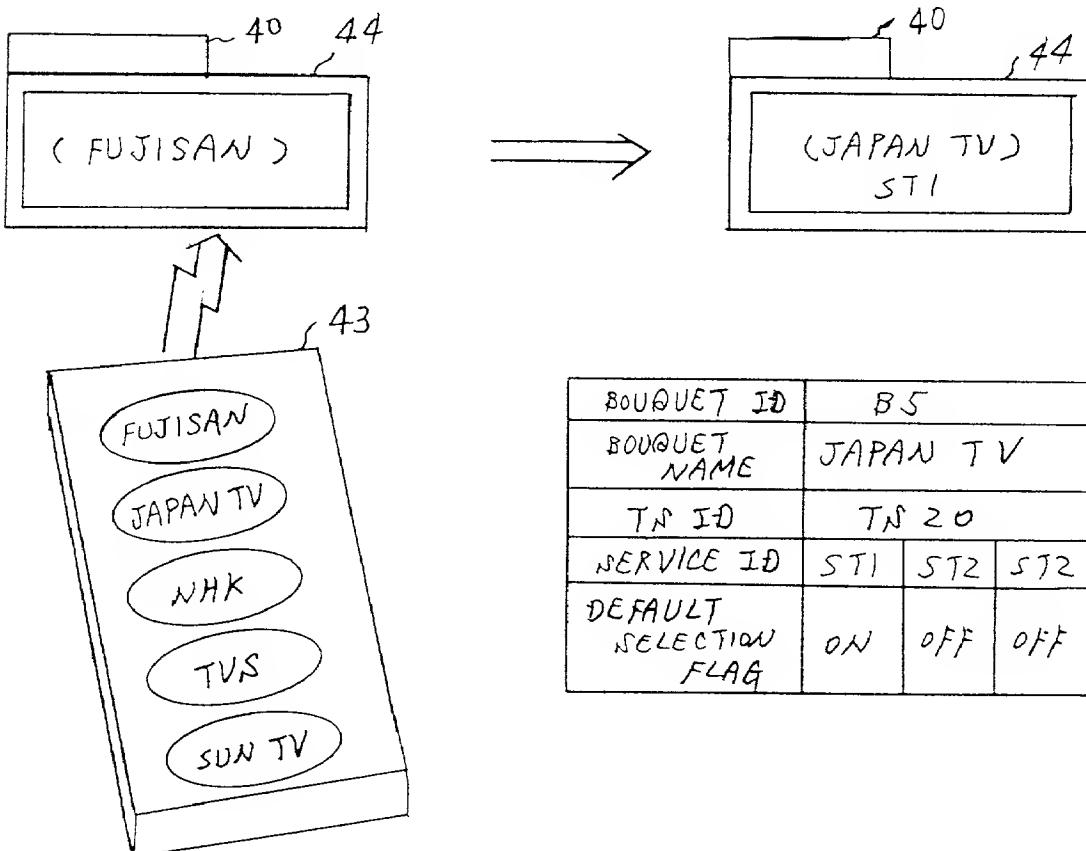


FIG. 18

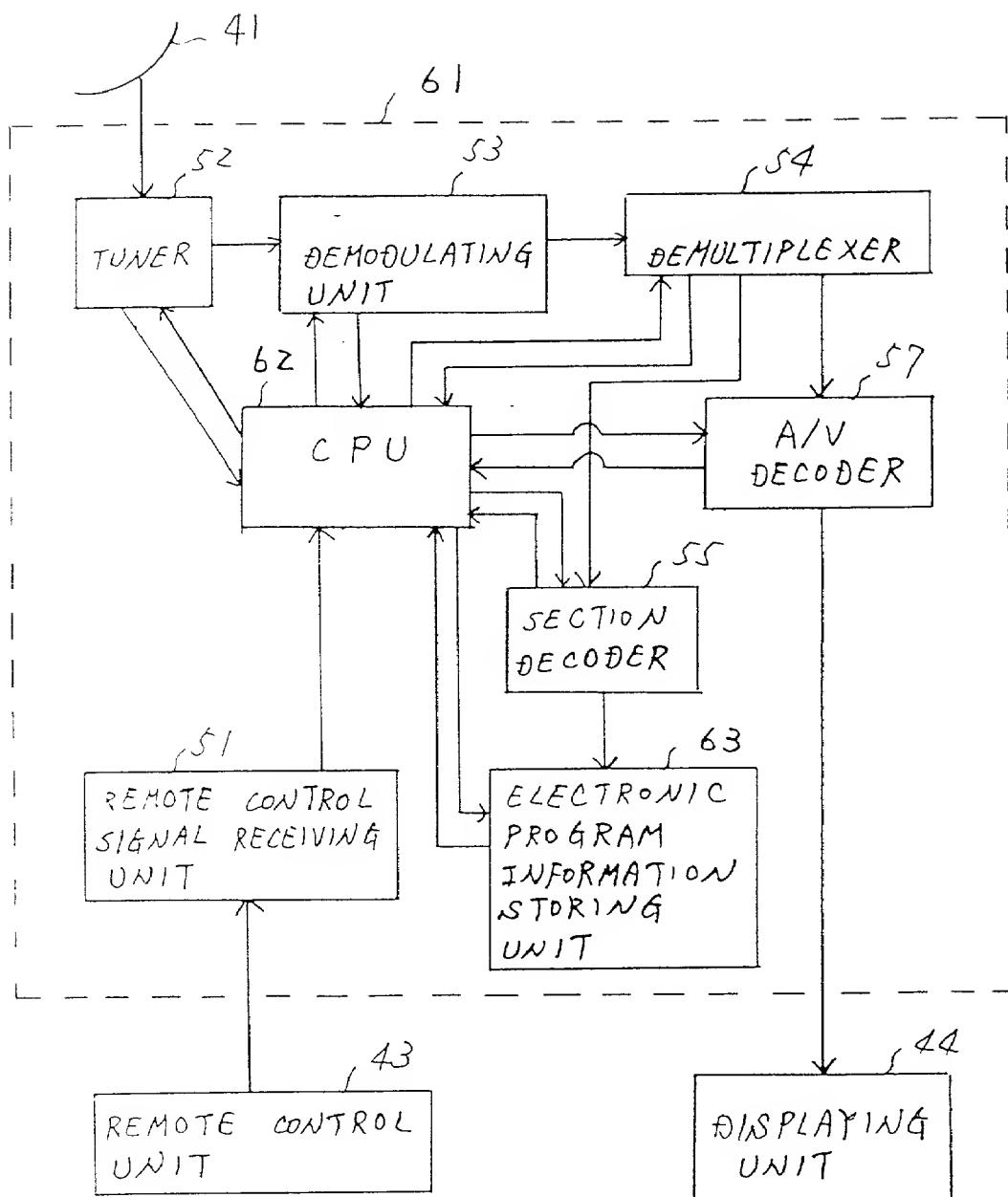


FIG. 19

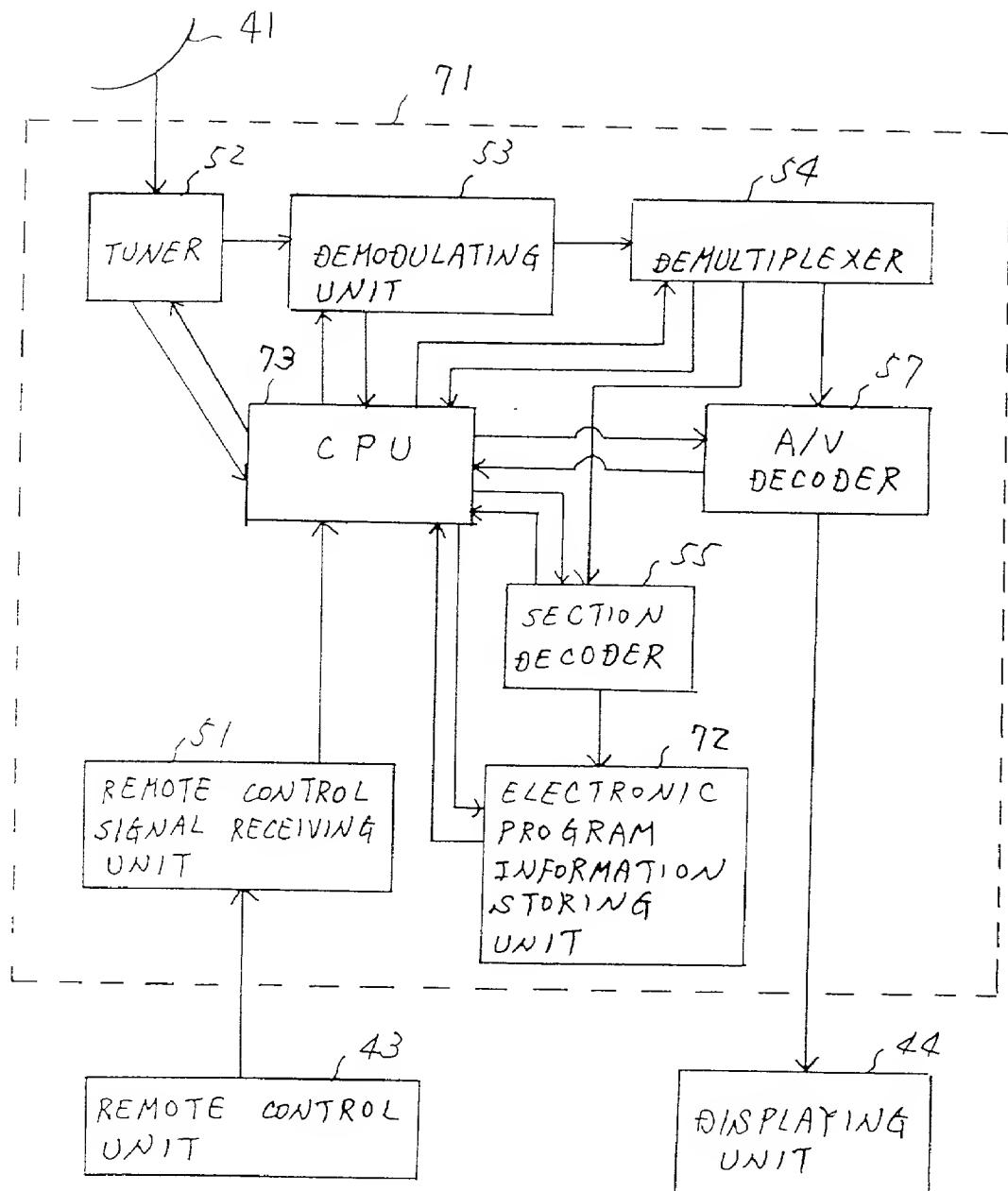


FIG. 20

EIT

SERVICE ID	ST6				
TS ID	TS30				
EVENT ID	TP30	TP35	TP40	TP42	TP89
TITLE			1	1	
BROADCASTING START DATE AND TIME			1	1	
DURATION OF BROADCAST			1	1	
EVENT LINK INFORMATION			1	1	

SERVICE ID	ST7				
TS ID	TS30				
EVENT ID	TP50	TP51	TP52	TP53	TP54
TITLE			1	1	
BROADCASTING START DATE AND TIME			1	1	
DURATION OF BROADCAST			1	1	
EVENT LINK INFORMATION			ST6 TS30 TP40	1	

SERVICE ID	ST8				
TS ID	TS30				
EVENT ID	TP60	TP61	TP62	TP63	TP64
TITLE			1		
BROADCASTING START DATE AND TIME			1		
DURATION OF BROADCAST			1		
EVENT LINK INFORMATION			ST6 TS30 TP40		

FIG. 21

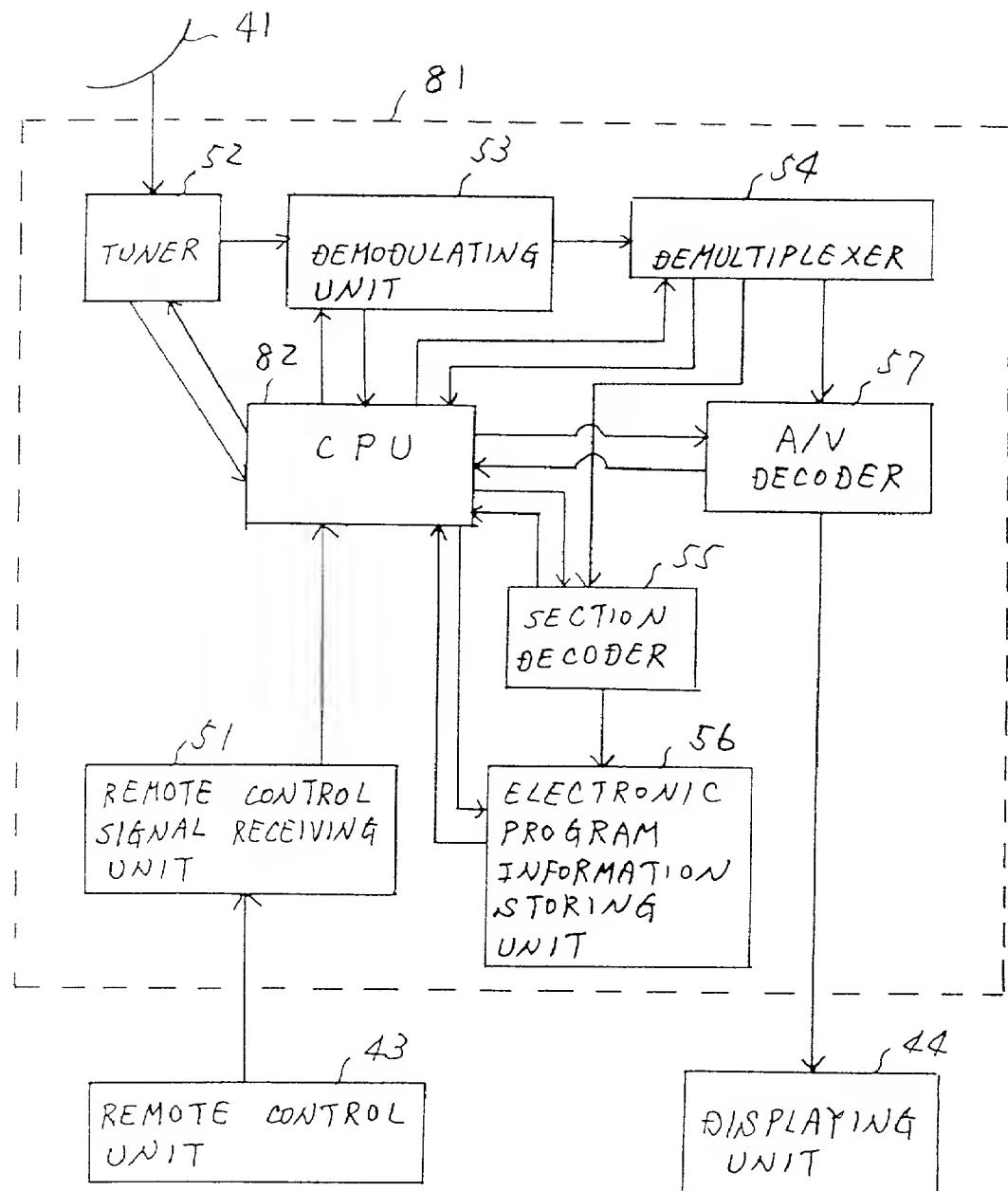


FIG. 22

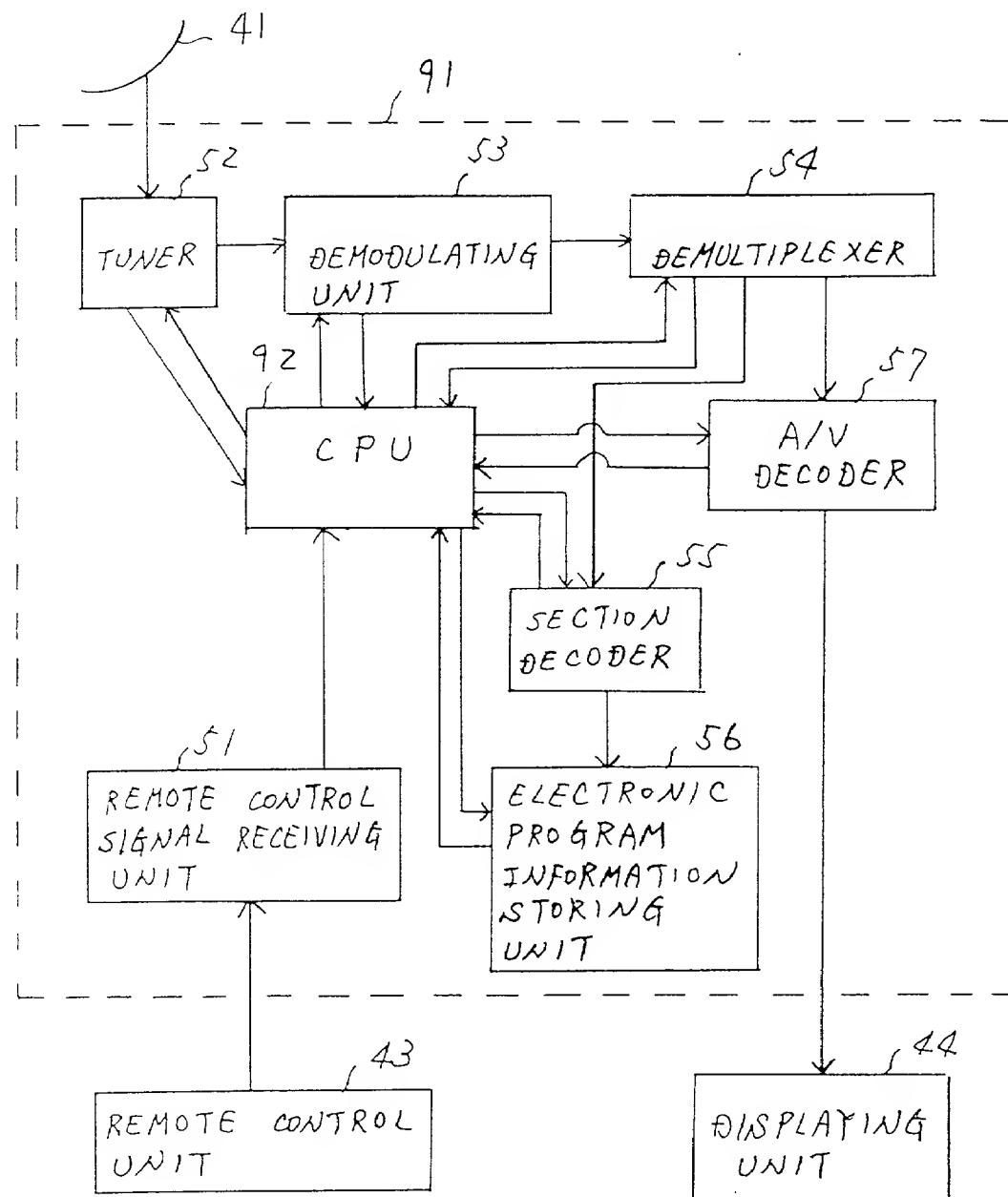


FIG. 23

TELEVISION CHANNEL	CH5	CH6	CH7	CH8
3:00		SDTV	SDTV	SDTV
4:00				
5:00	SDTV		HDTV	
6:00		DATA	DATA	MUSIC
7:00			SDTV	
8:00				SDTV

FIG. 25

TELEVISION CHANNEL	CH1	CH2	CH3	CH4
15:00	SDTV	SDTV		SDTV
16:00				
17:00	HDTV	HDTV	SDTV	HDTV
18:00		DATA	DATA	MUSIC
19:00	SDTV			SDTV
20:00				

FIG. 24

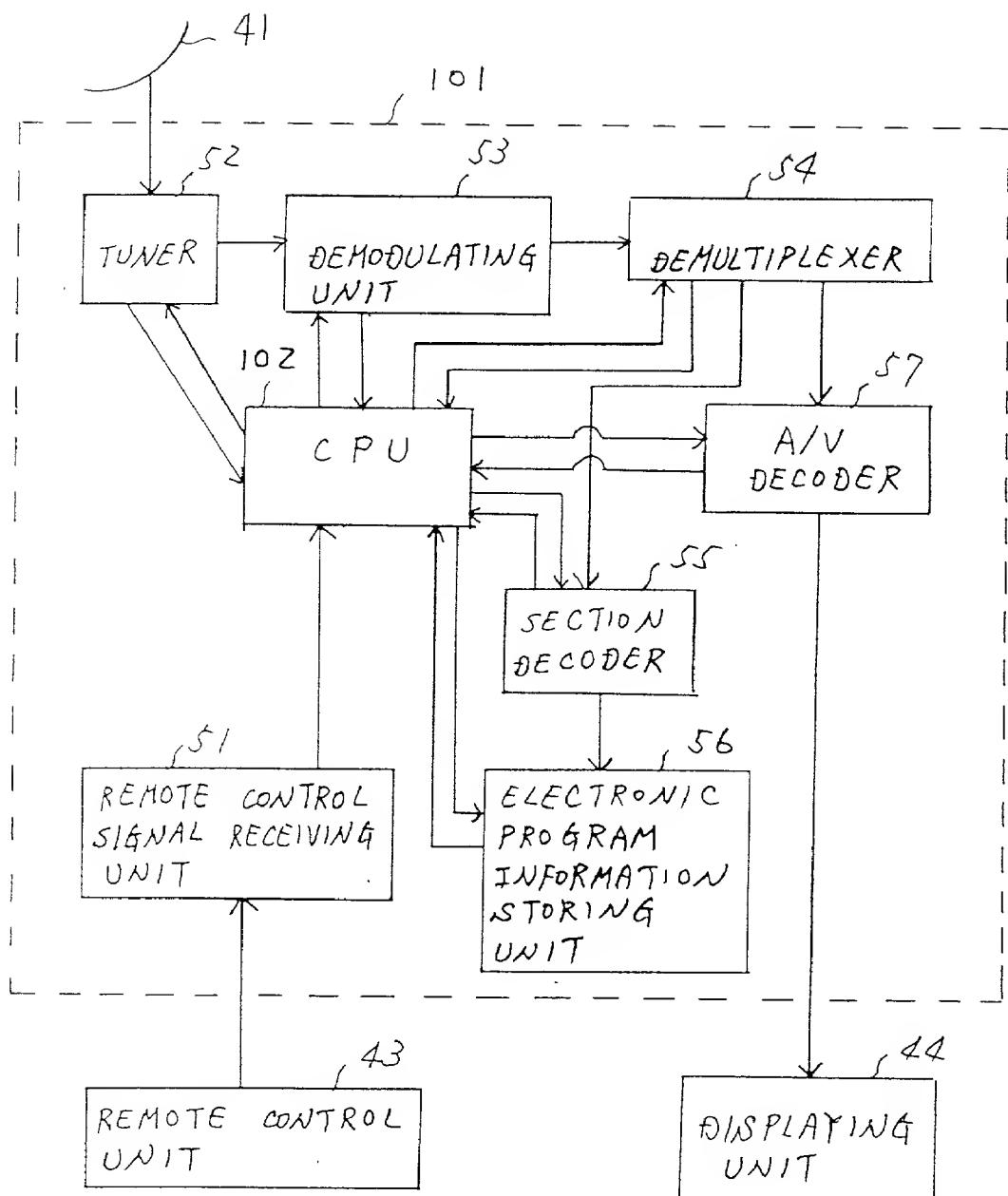


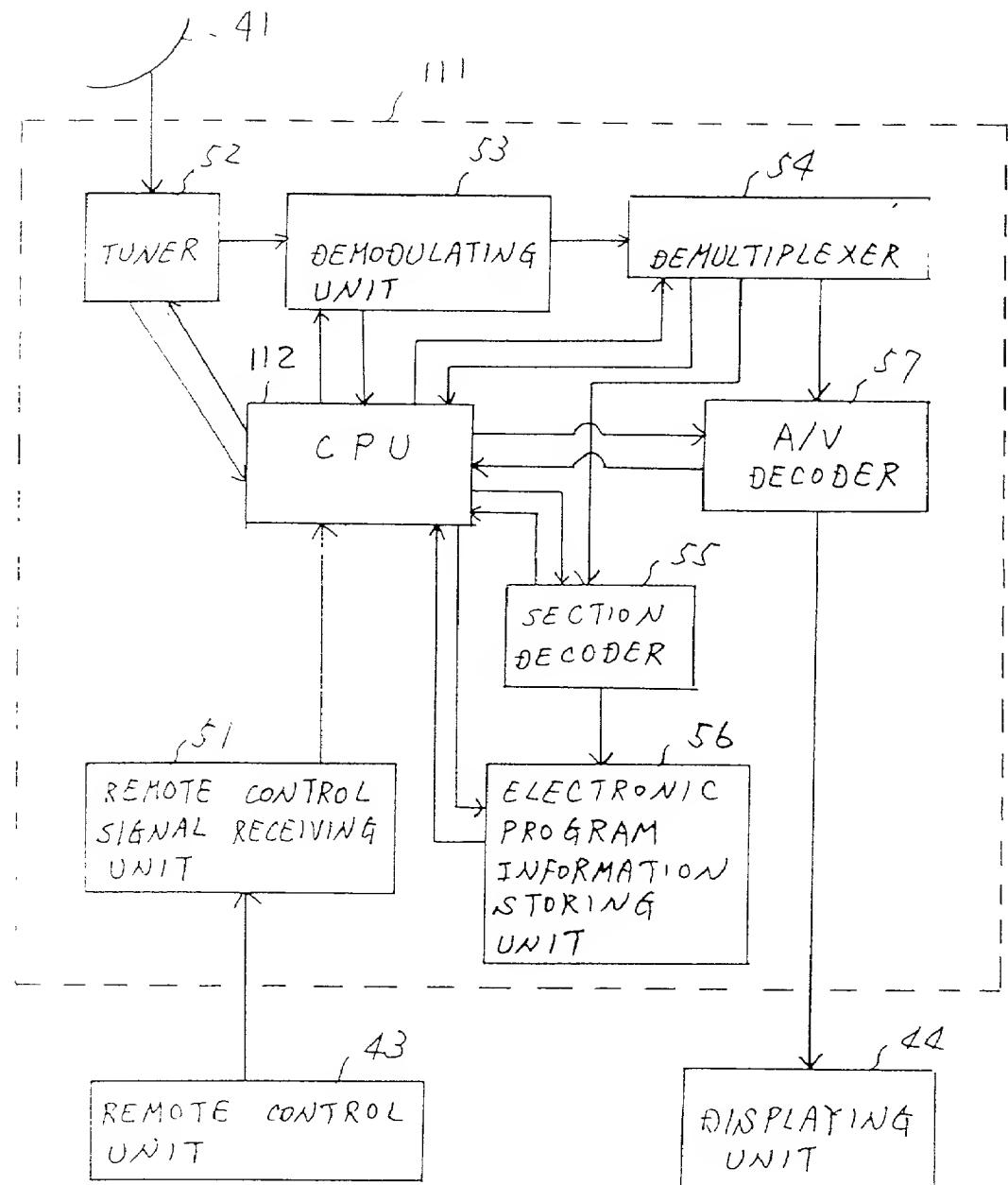
FIG. 26

EVENT INFORMATION TABLE (EIT)

SERVICE ID	ST4				
TS ID	TS30				
EVENT ID	TP30	TP35	TP40	TP42	TP89
TITLE	WEATHER	CYCLING	NEWS	VEGETABLES	GET UP!
BROADCASTING START DATE AND TIME	'97 11/14 4:00	'97 11/14 5:00	'97 11/14 6:00	'97 11/14 7:00	'97 11/14 8:00
DURATION OF BROADCAST	60	60	60	60	60
TRANSMISSION BANDWIDTH	5 Mbps	5 Mbps	18 Mbps	6 Mbps	4 Mbps

SERVICE ID	ST5				
TS ID	TS30				
EVENT ID	TP31	TP32	TP41	TP43	TP88
TITLE	WORLD NEWS	TRICYCLE	HELP!	WORLD WEATHER	LOCAL NEWS
BROADCASTING START DATE AND TIME	'97 11/14 4:00	'97 11/14 5:00	'97 11/14 6:00	'97 11/14 7:00	'97 11/14 8:00
DURATION OF BROADCAST	60	60	60	60	60
TRANSMISSION BANDWIDTH	18 Mbps	5 Mbps	9 Mbps	6 Mbps	6 Mbps

FIG. 27



23/43

FIG. 28

4:00	WEATHER	WORLD NEWS	
5:00	CYCLING	TRICYCLE	
6:00	NEWS		HELP!
7:00	VEGETABLES	WORLD WEATHER	
8:00	GET UP!	LOCAL NEWS	

FIG. 29

144

TODAY'S PROGRAM GUIDE				
	CH30	CH31	CH32	CH33
3:00	PR1	PR8	PR13	PR18
4:00	PR2	PR9		PR19
5:00	PR3			PR20
6:00	PR4		PR14	
7:00	PR5	PR10	PR15	
8:00	PR6	PR11	PR16	
9:00	PR7	PR12	PR17	

FIG. 30

SERVICE TYPE	DATA	MUSIC	SDTV	HDTV
DISPLAY WIDTH RATIO	1	1	5	15

FIG. 32

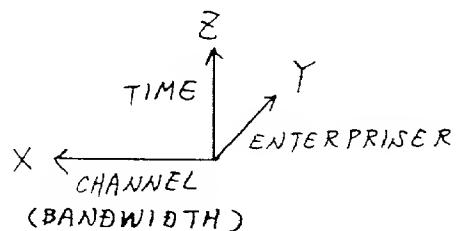
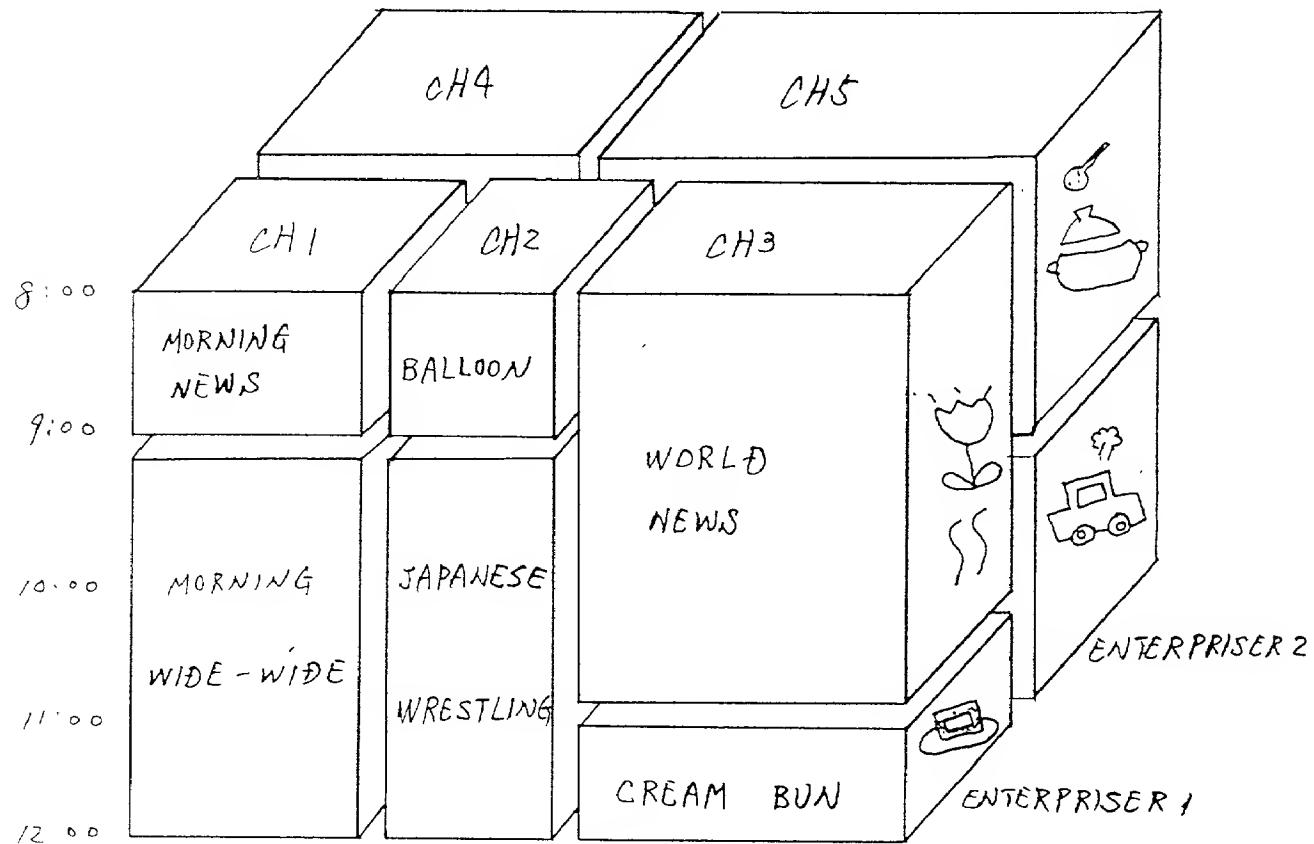


FIG. 31

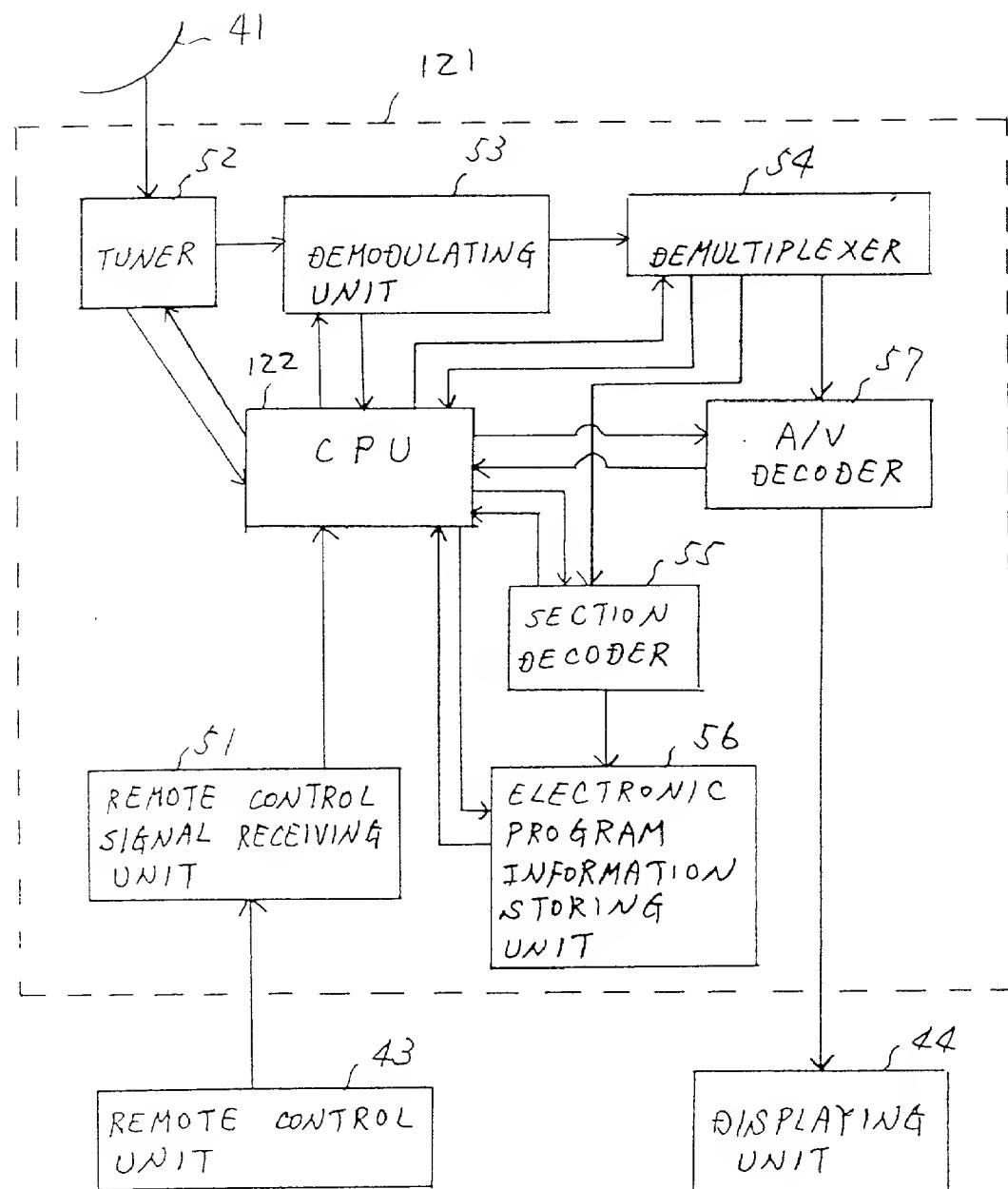


FIG. 33

## ELECTRONIC PROGRAM GUIDE

	CH1	CH2	CH3	CH4	CH5
3:00	TP100	TP102	TP103	TP108	TP104
4:00	---	---	TP105	---	TP104
5:00	TP101	TP110	TP106	TP109	TP111
6:00			TP107		

SELECTION ROUTE

FIG. 34

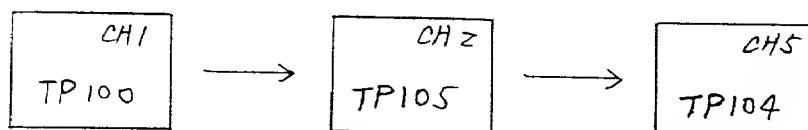


FIG. 36

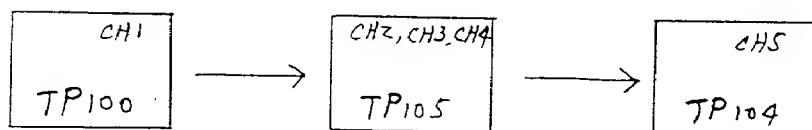


FIG. 35

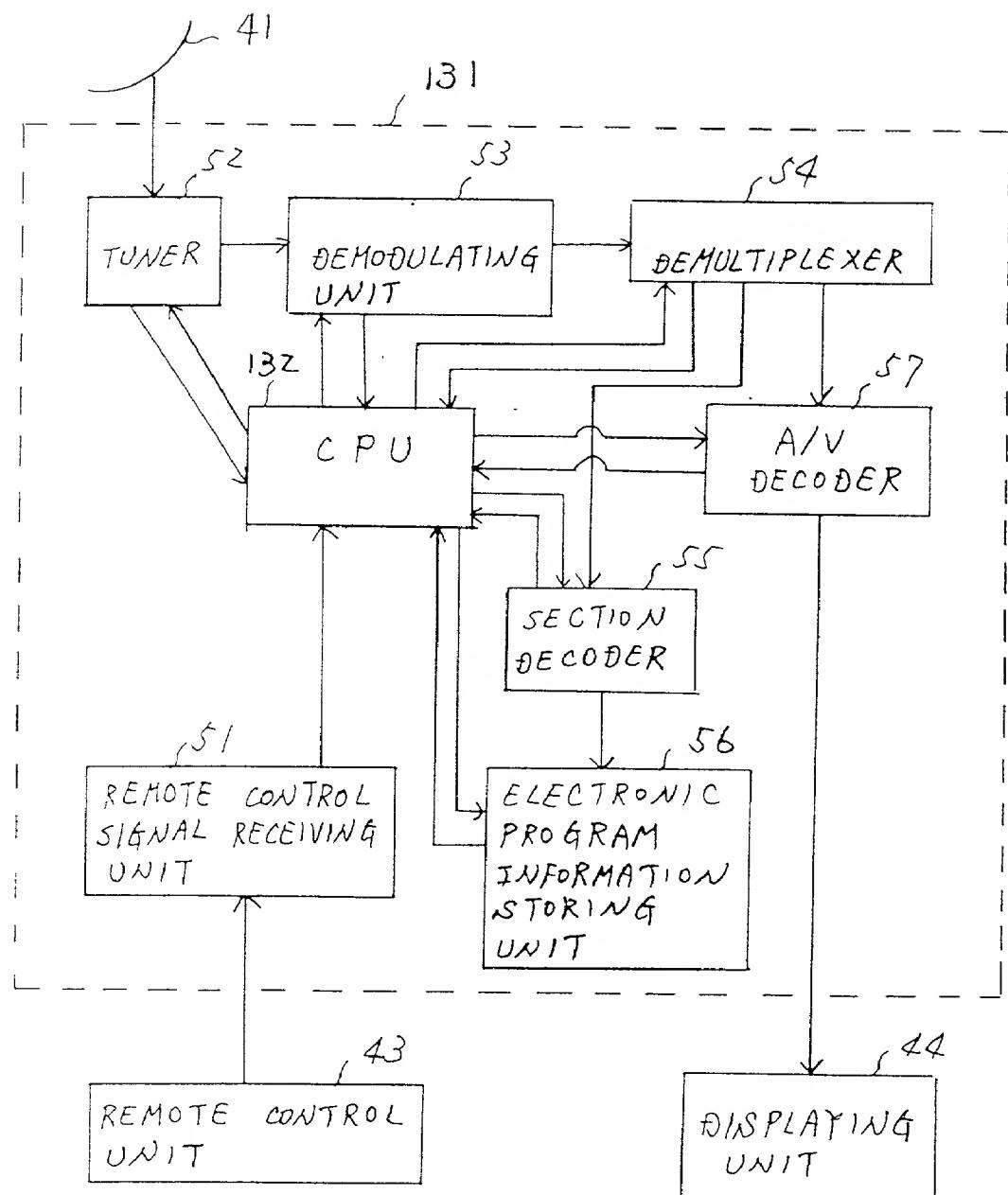


FIG. 37

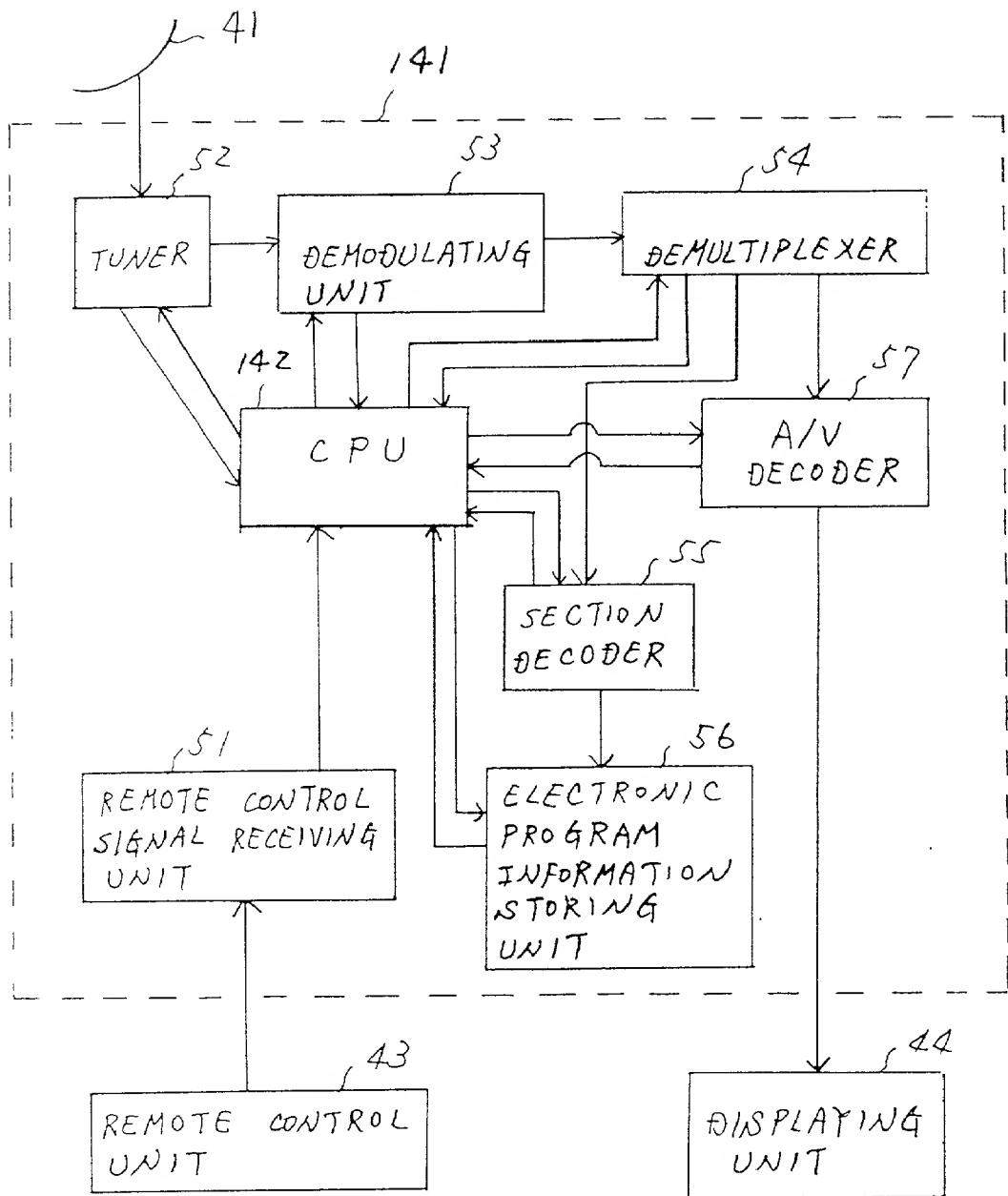


FIG. 38

CHANNEL SERVICE ID	ST101	ST103	ST900	ST901	ST902	ST903
SERVICE TYPE	SDTV	MUSIC	MUSIC	MUSIC	MUSIC	MUSIC
SUB-CHANNEL SERVICES OF ST103						

FIG. 39

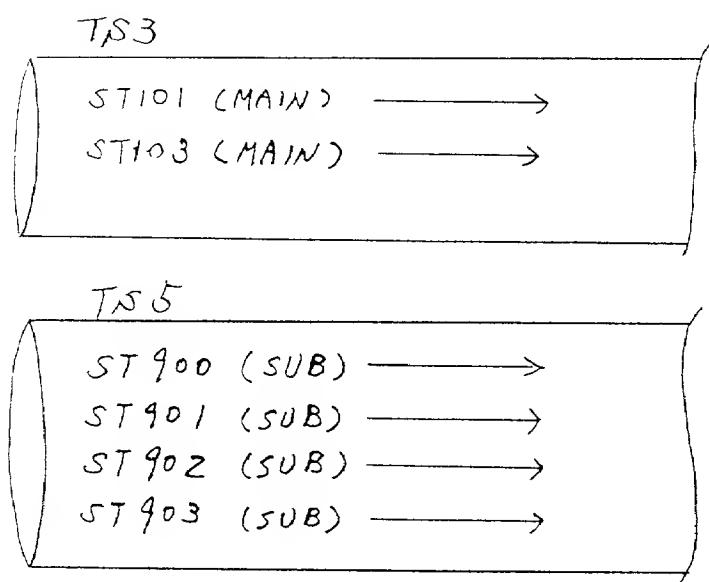


FIG. 40

SDT

TS ID	TS3	
SERVICE ID	ST101	ST103
SERVICE NAME	WEATHER!	MC
SERVICE TYPE	SDTV	MUSIC
MAIN / SUB	MAIN	MAIN
REFERENTIAL SERVICE	—	ST900 ~ ST903
REFERENTIAL TS	—	TS5

FIG. 41

SDT

TS ID	TS3		TS5			
SERVICE ID	ST101	ST103	ST900	ST901	ST902	ST903
SERVICE NAME	WEATHER	MC	MUSIC 1	MUSIC 2	MUSIC 3	MUSIC 4
SERVICE TYPE	SDTV	MUSIC	MUSIC	MUSIC	MUSIC	MUSIC
MAIN/SUB	MAIN	MAIN	SUB	SUB	SUB	SUB
REFERENTIAL SERVICE	—	ST900 ST903	ST103	ST103	ST103	ST103
REFERENTIAL TS	—	TS3	TS5			

FIG. 42

EIT

SERVICE ID	ST101					
TS ID	TS3					
EVENT ID	TP50	TP51	TP52	TP53	TP54	TP55
TITLE	TODAY'S WEATHER	TOMORROW WEATHER	WEATHER OF U.S.A	WEATHER OF JAPAN	WEATHER OF ASIA	WORLD WEATHER
BROADCASTING START TIME	10:00	11:00	12:00	12:30	13:00	13:30
DURATION OF BROADCAST	60	60	30	30	30	30

FIG. 43

EIT

SERVICE ID	ST103					
TS ID	TS3					
EVENT ID	TP3	TP4	TP5	TP6	TP7	TP8
TITLE	MUSIC A	MUSIC B	MUSIC C	MUSIC D	MUSIC E	MUSIC E
BROADCASTING START TIME	10:00	11:00	12:00	12:30	13:00	13:30
DURATION OF BROADCAST	60	60	30	30	30	30

31/43

FIG. 44

EIT

SERVICE ID	ST 900					
TS ID	TS 5					
EVENT ID	TP200	TP201	TP202	TP203	TP204	TP205
TITLE			MUSIC			
BROADCASTING START TIME			12:00			
DURATION OF BROADCAST			30			

EIT

SERVICE ID	ST 901					
TS ID	TS 5					
EVENT ID	TP206	TP207	TP208	TP209	TP210	TP211
TITLE			MUSIC			
BROADCASTING START TIME			12:00			
DURATION OF BROADCAST			30			

EIT

SERVICE ID	ST 902					
TS ID	TS 5					
EVENT ID	TP1000	TP1001	TP1002	TP1003	TP1004	TP1005
TITLE			MUSIC			
BROADCASTING START TIME			12:00			
DURATION OF BROADCAST			30			

EIT

SERVICE ID	ST 903					
TS ID	TS 5					
EVENT ID	TP1100	TP1101	TP1102	TP1103	TP1104	TP1105
TITLE			MUSIC			
BROADCASTING START TIME			12:00			
DURATION OF BROADCAST			30			

FIG. 45

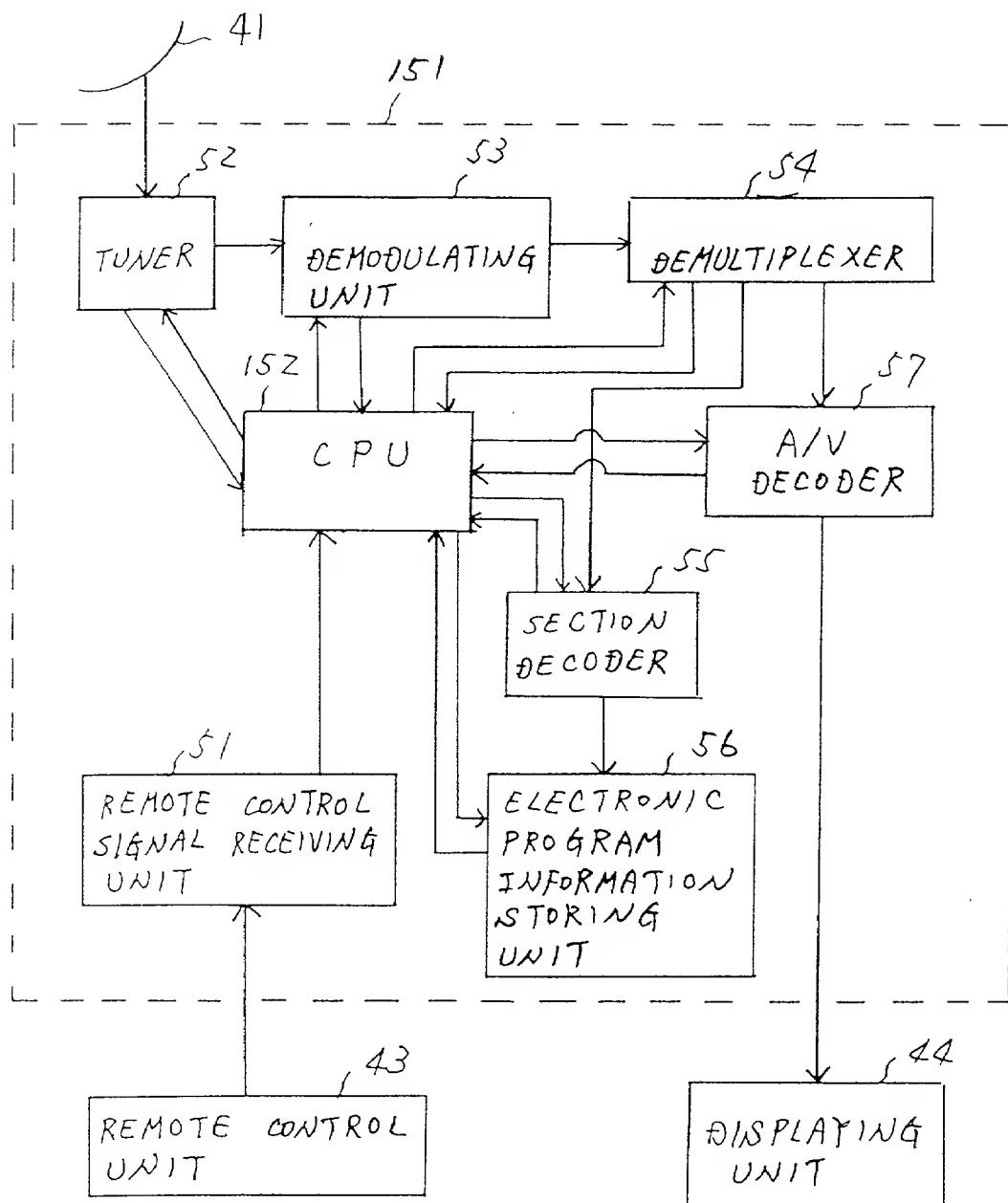


FIG. 46

TS 3

ST101

ST103

ELECTRONIC PROGRAM INFORMATION  
OF ST101 AND ST103

TS5

ST900

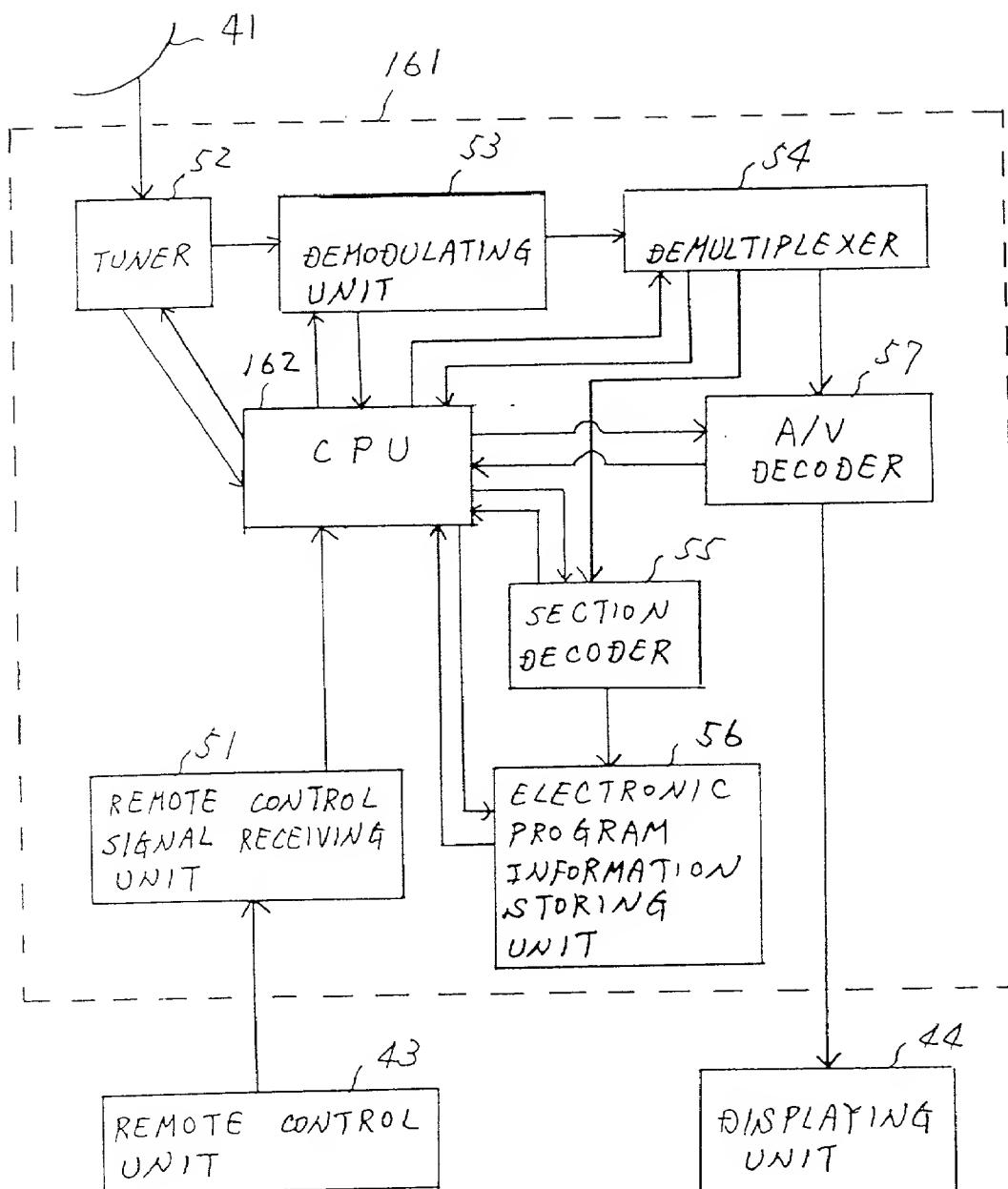
ST901

ST902

ST903

ELECTRONIC PROGRAM INFORMATION  
OF ST900, ST901, ST902 AND ST903ELECTRONIC PROGRAM INFORMATION  
OF ST101 AND ST103

FIG. 47



F/B.48

TS3

ST101

ST103

ELECTRONIC PROGRAM INFORMATION

OF ST101, ST103, ST105 AND ST106

ELECTRONIC PROGRAM INFORMATION OF

ST900, ST901, ST902, ST903, ST910 AND ST911

TS5

ST900

ST901

ST902

ST903

ELECTRONIC PROGRAM INFORMATION OF

ST101, ST103, ST105 AND ST106

ELECTRONIC PROGRAM INFORMATION OF

ST900, ST901, ST902, ST903, ST910 AND ST911

TS6

ST105

ELECTRONIC PROGRAM INFORMATION OF

ST101, ST103, ST105 AND ST106

ELECTRONIC PROGRAM INFORMATION OF

ST900, ST901, ST902, ST903, ST910 AND ST911

TS7

ST910

ST911

ELECTRONIC PROGRAM INFORMATION OF

ST101, ST103, ST105 AND ST106

ELECTRONIC PROGRAM INFORMATION OF

ST900, ST901, ST902, ST903, ST910 AND ST911

TS8

ST106

ELECTRONIC PROGRAM INFORMATION OF

ST101, ST103, ST105 AND ST106

FIG. 49

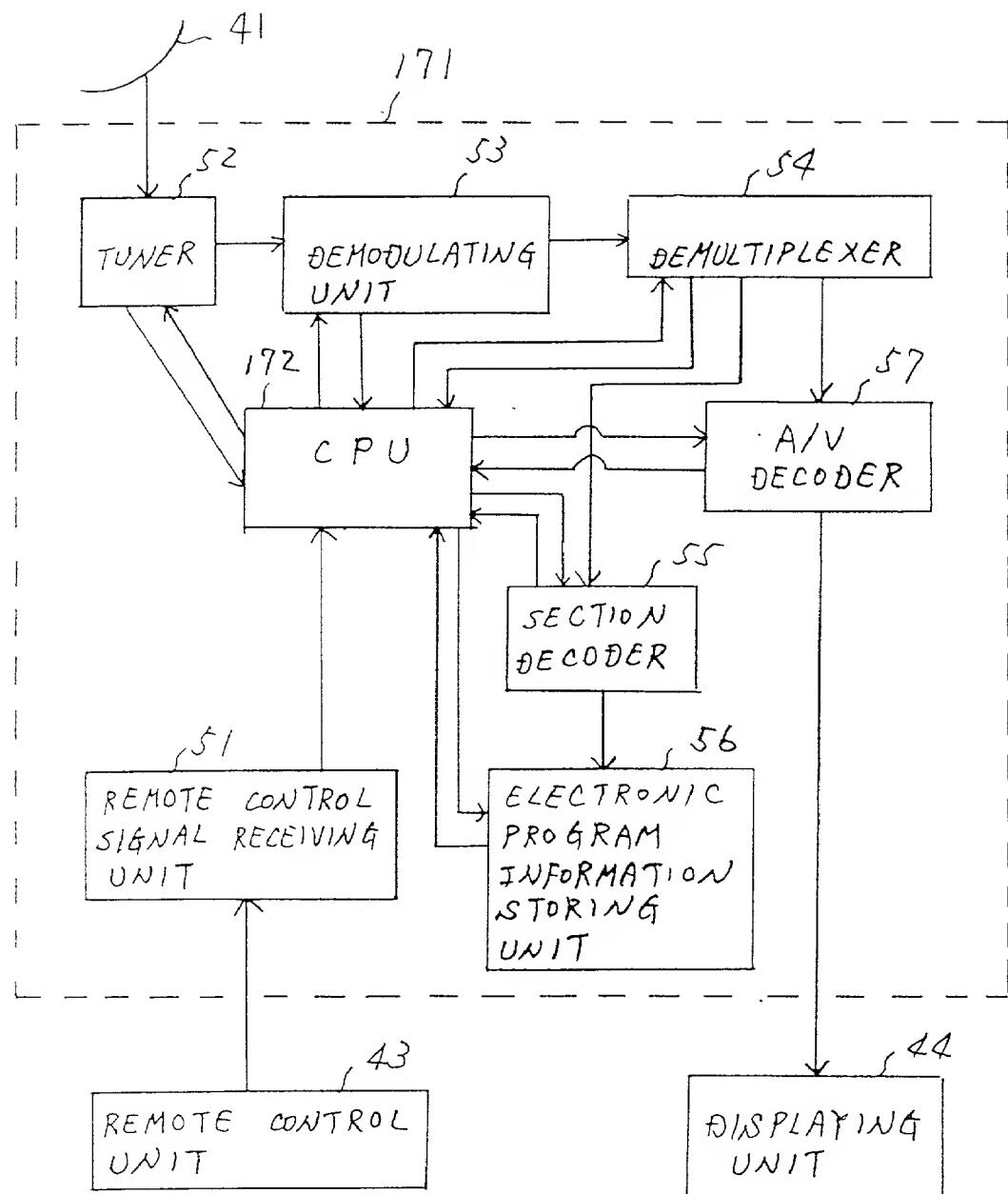


FIG. 50

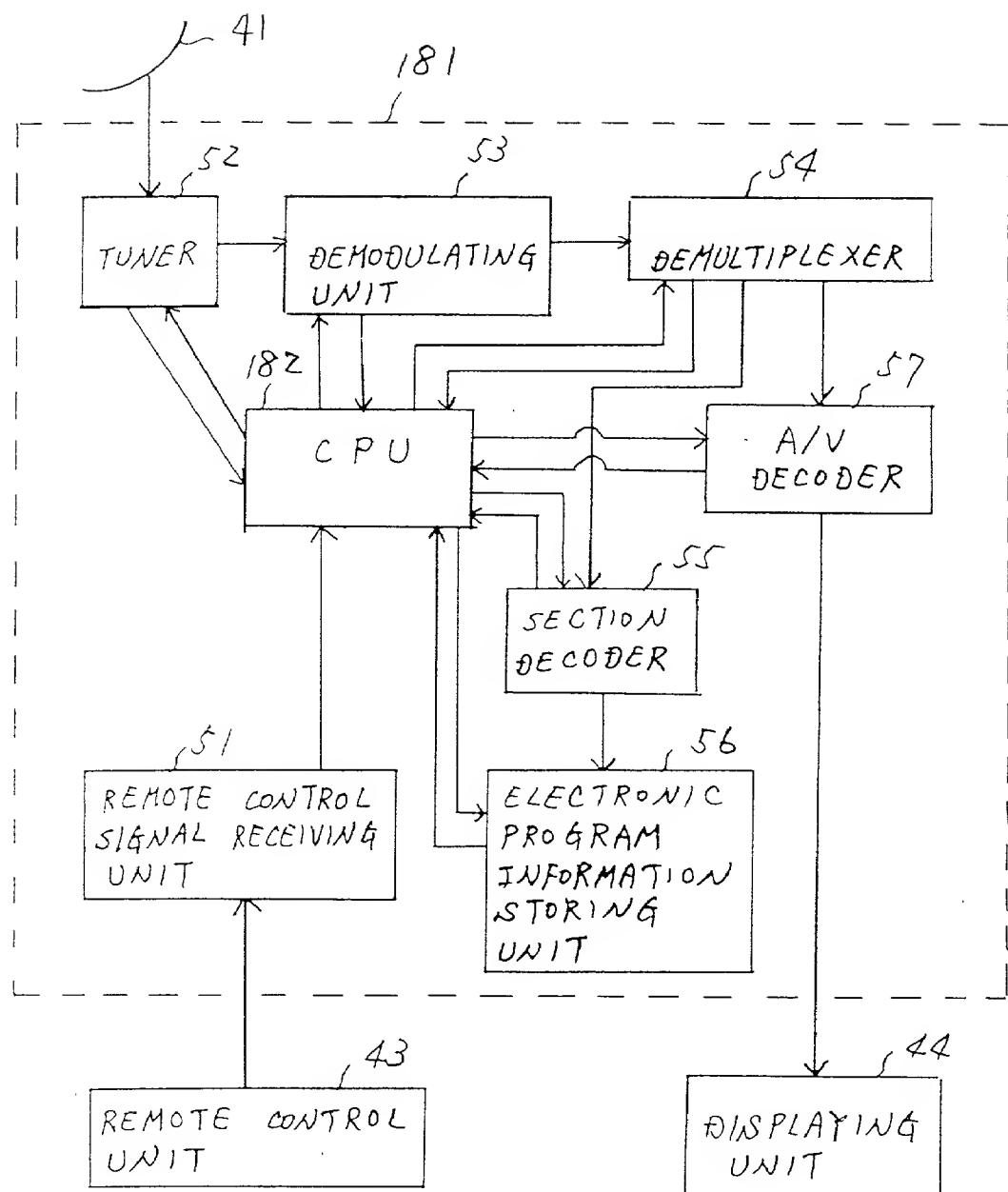


FIG. 51A

44

TODAY'S PROGRAM GUIDE				
	CH30	CH31	CH32	CH33
3:00	PR1	PR8	PR13	PR18
4:00	PR2			PR19
5:00	PR3	PR9		
6:00	PR4		PR14	PR20
7:00	PR5	PR10	PR15	
8:00	PR6	PR11	PR16	
9:00	PR7	PR12	PR17	

FIG. 51B

44

MUSIC CHANNELS						
	CH50	CH51	CH52	CH53	CH54	CH55
3:00	MUSIC 1	MUSIC 2	MUSIC 3	MUSIC 4	MUSIC 5	MUSIC 6
3:00	CH56	CH57	CH58	CH59	CH60	CH61
	MUSIC 7	MUSIC 8	MUSIC 9	MUSIC 10	MUSIC 11	MUSIC 12
3:00	CH62	CH63	CH64	CH65	CH66	CH67
	MUSIC 13	MUSIC 14	MUSIC 15	MUSIC 16	MUSIC 17	MUSIC 18
3:00	CH68	CH69	CH70	CH71	CH72	CH73
	MUSIC 19	MUSIC 20	MUSIC 21	MUSIC 22	MUSIC 23	MUSIC 24
	<a href="#">BEFORE</a>	<a href="#">NEXT</a>	<a href="#">RETURN</a>			

FIG. 52

SDT

TS ID	TS3		TS5			
CHANNEL SERVICE ID	ST101	ST103	ST900	ST901	ST902	ST903
SERVICE NAME	WEATHER	MC	MUSIC 1	MUSIC 2	MUSIC 3	MUSIC 4
SERVICE TYPE	SDTV	MUSIC	MUSIC	MUSIC	MUSIC	MUSIC
MAIN/SUB	MAIN	MAIN	SUB	SUB	SUB	SUB
REFERENTIAL SERVICE	—	ST900 ST903	ST103	ST103	ST103	ST103
REFERENTIAL TS	—	TS5	TS3			
DEFAULT SUB-CHANNEL SERVICE SELECTING FLAG	—	—	ON	OFF	OFF	OFF

FIG. 54

SDT

TS ID	TS3		TS5			
CHANNEL SERVICE ID	ST101	ST103	ST900	ST901	ST902	ST903
SERVICE NAME	WEATHER	MC	MUSIC 1	MUSIC 2	MUSIC 3	MUSIC 4
SERVICE TYPE	SDTV	MUSIC	MUSIC	MUSIC	MUSIC	MUSIC
MAIN/SUB	MAIN	MAIN	SUB	SUB	SUB	SUB
REFERENTIAL SERVICE	—	ST900 ST903	ST103	ST103	ST103	ST103
REFERENTIAL TS	—	TS5	TS3			
VIEWER ATTRIBUTE	AGE	—	19 OR MORE	1 TO 5	60 OR MORE	20 TO 30
DISTRICT	—	—	JAPAN	JAPAN	EAST AREA	NORTH AREA

FIG. 53

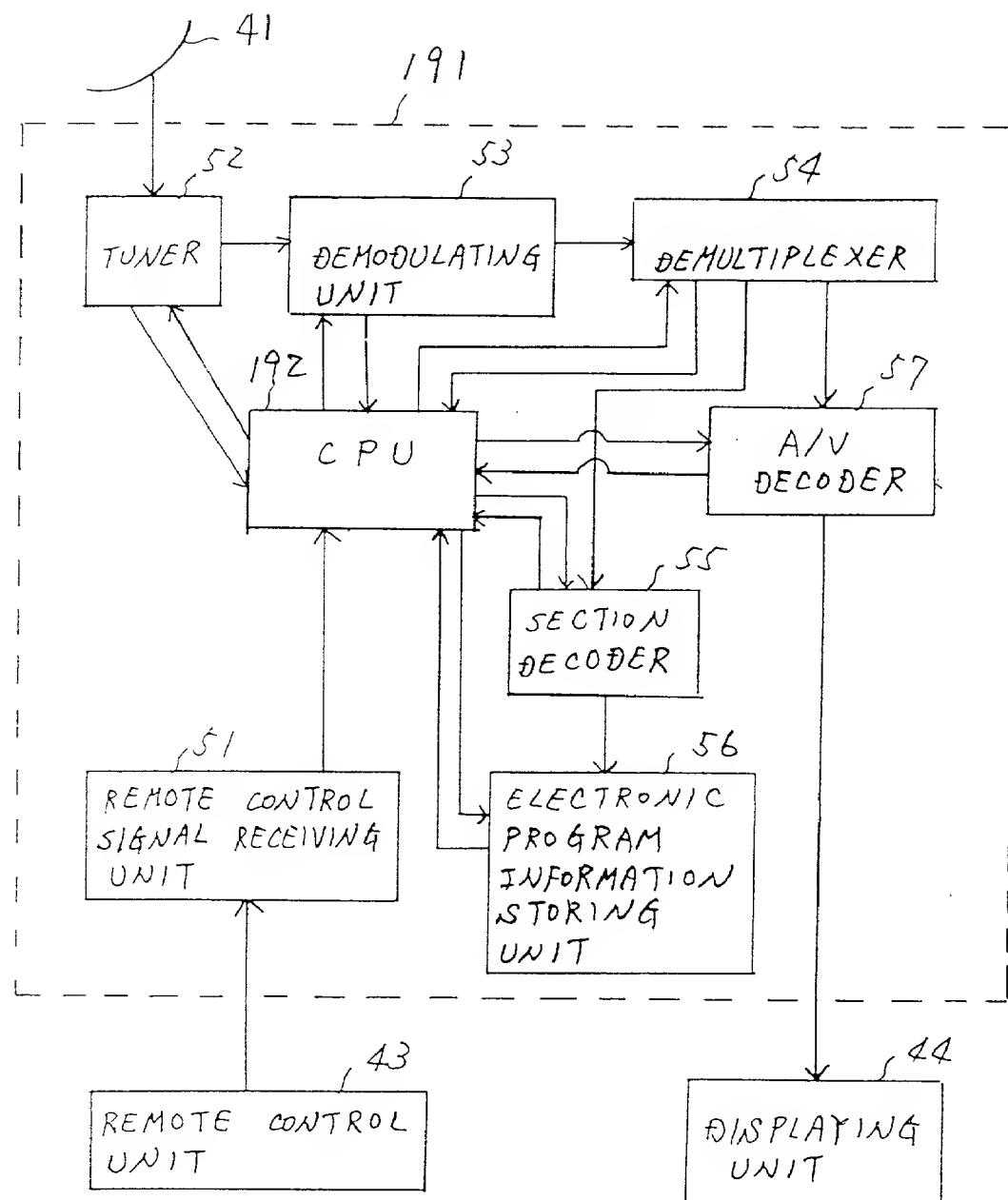


FIG. 55

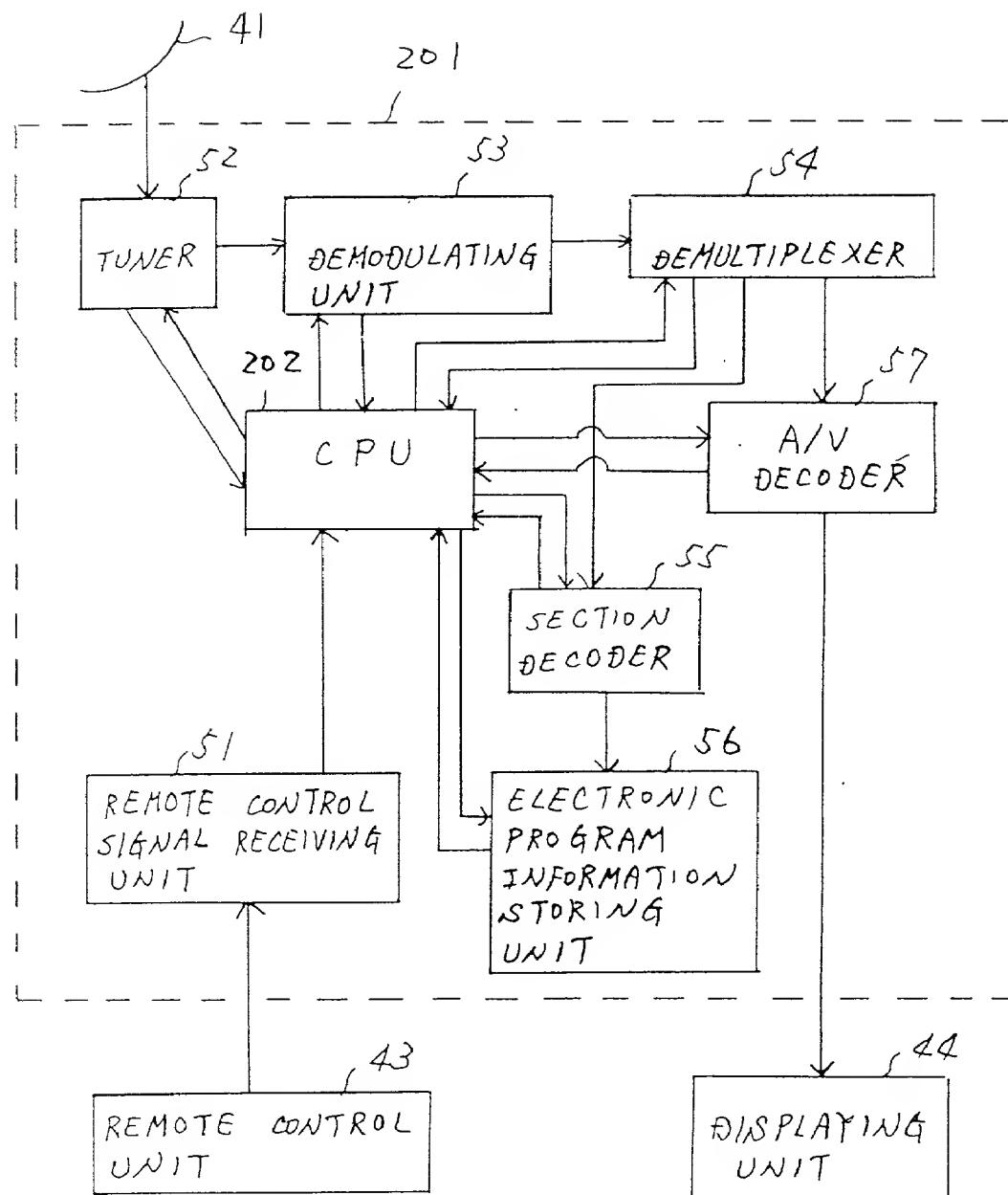
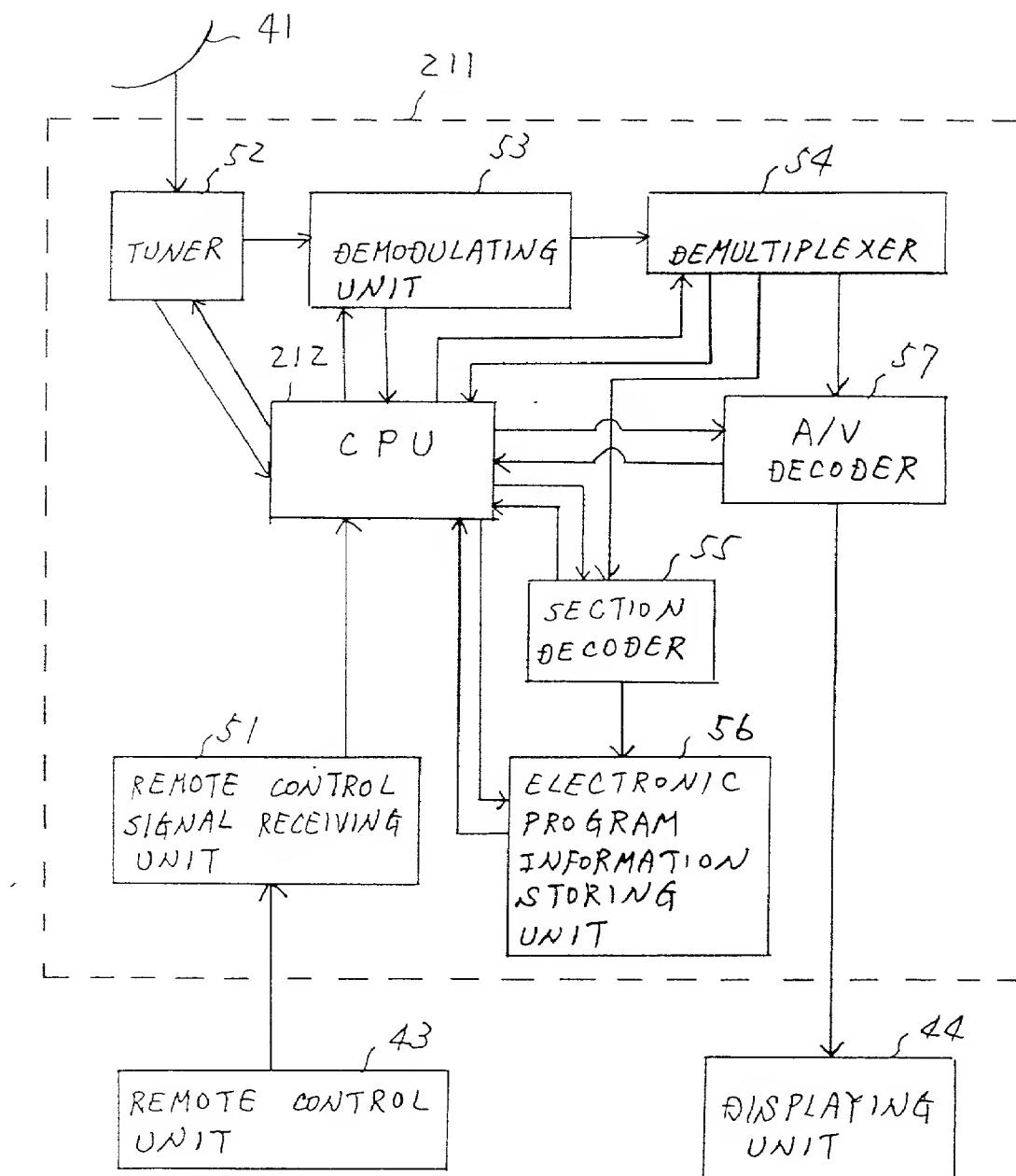


FIG. 56

SDT

TS ID	TS3		TS5			
CHANNEL SERVICE ID	ST101	ST103	ST900	ST901	ST902	ST903
SERVICE NAME	WEATHER	MC	MUSIC 1	MUSIC 2	MUSIC 3	MUSIC 4
SERVICE TYPE	SDTV	MUSIC	MUSIC	MUSIC	MUSIC	MUSIC
MAIN/SUB	MAIN	MAIN	SUB	SUB	SUB	SUB
REFERENTIAL SERVICE	—	ST900 ST903	ST103	ST103	ST103	ST103
REFERENTIAL TS	—	TS5	TS3			
GENRE	—	—	MOVIE	SPORTS	NEWS	NEWS

FIG. 57



Docket No.:

## **DECLARATION AND POWER OF ATTORNEY**

As a below named inventor, I hereby declare that:

My residence, post office and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter claimed and for which a patent is sought on the invention entitled

METHOD AND APPARATUS FOR PREPARING AND TRANSMITTING ELECTRONIC  
PROGRAM INFORMATION AND APPARATUS FOR PRODUCING ELECTRONIC  
PROGRAM GUIDE FROM THE ELECTRONIC PROGRAM INFORMATION

the specification of which

is attached hereto      [ ] was filed on      as Application Serial No.      and was amended on      (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is known to me to be material to patentability in accordance with Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT international application which designated at least one country other than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

<b>Prior Foreign Application(s):</b>			<b>Priority Claimed</b>	
<u>Number</u>	<u>Country</u>	<u>Day/Month/Year filed</u>	<u>Yes</u>	<u>No</u>
9-352048	Japan	December 5, 1997	X	

I hereby authorize the U. S. attorneys and agents named herein to accept and follow instructions from **PATENT DEVELOPMENT INTERNATIONAL, INC. or from its employees** as to any actions to be taken in the Patent and Trademark Office regarding this application without direct communication between the U. S. attorney(s) and the undersigned. In the event of a change in the person(s) from whom instructions may be taken, the U. S. attorney(s) will be so notified by the undersigned.

I hereby claim the benefit under 35 USC §119(e) of any United States provisional application(s) listed below.

<b>Prior Provisional Application(s):</b>	
<u>Application Number</u>	<u>Filing Date</u>

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s), or Section 365(c) of any PCT international application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

<b>Prior U. S. Application(s):</b>		<u>Status: Patented, Pending, Abandoned</u>
<u>Serial No.</u>	<u>Filing Date</u>	

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are

believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint the following attorney(s) and/or agent(s): Allan M. Lowe, Reg. No. 19,641; Israel Gopstein, Reg. No. 27,333; Benjamin J. Hauptman, Reg. No. 29,310; Kenneth M. Berner, Reg. No. 37,093 and Michael G. Gilman, Reg. No. 19,114. all of

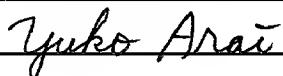
LOWE HAUPTMAN GOPSTEIN GILMAN & BERNER, LLP  
99 Canal Center Plaza, Suite 420  
Alexandria, Virginia 22314

with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith, and all future correspondence should be addressed to them.

\*\*\*\*\*

Full name of sole or first inventor: Yuko Arai

Inventor's signature:



Date: Nov. 30, 1998

Residence: Tokyo, Japan

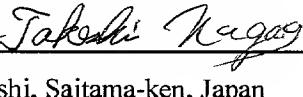
Citizenship: Japanese

Post Office Address: 1-28-9, Nishikojiya, Ota-ku, Tokyo 144-0034 Japan

\*\*\*\*\*

Full name of second joint inventor: Takeshi Nagao

Inventor's signature:



Date: Nov. 30, 1998

Residence: Kawaguchi-shi, Saitama-ken, Japan

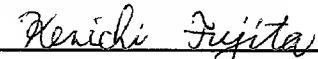
Citizenship: Japanese

Post Office Address: 4-7-21-504, Hon-cho, Kawaguchi-shi, Saitama-ken 332-0012 Japan

\*\*\*\*\*

Full name of third joint inventor: Kenichi Fujita

Inventor's signature:



Date: Nov. 30, 1998

Residence: Kawasaki, Japan

Citizenship: Japanese

Post Office Address: 2-14-1-205, Ta-machi, Kawasaki-ku, Kawasaki, 210-0085 Japan

\*\*\*\*\*

Full name of fourth joint inventor: Hiroki Shinohara

Inventor's signature: Hiroki Shinohara

Date: Nov. 30, 1998

Residence: Yokohama, Japan

Citizenship: Japanese

Post Office Address: 517-1-205, Shinano-cho, Totsuka-ku, Yokohama 244-0811 Japan

\*\*\*\*\*

Full name of fifth joint inventor: Takayuki Suzuki

Inventor's signature: Takayuki Suzuki

Date: Nov. 30, 1998

Residence: Tokyo, Japan

Citizenship: Japanese

Post Office Address: 1-23-3-201, Honan, Suginami-ku, Tokyo 168-0062 Japan

Full name of sixth joint inventor: Aki Nakagawa

Inventor's signature: Aki Nakagawa

Date: Nov. 30, 1998

Residence: Fujisawa-shi, Kanagawa-ken, Japan

Citizenship: Japanese

Post Office Address: 6230-17-103, Tsujido, Fujisawa-shi, Kanagawa-ken, 332-0012 Japan

Full name of seventh joint inventor:

Inventor's signature:

Date:

Residence:

Citizenship:

Post Office Address:

Full name of eighth joint inventor:

Inventor's signature:

Date:

Residence:

Citizenship:

Post Office Address: